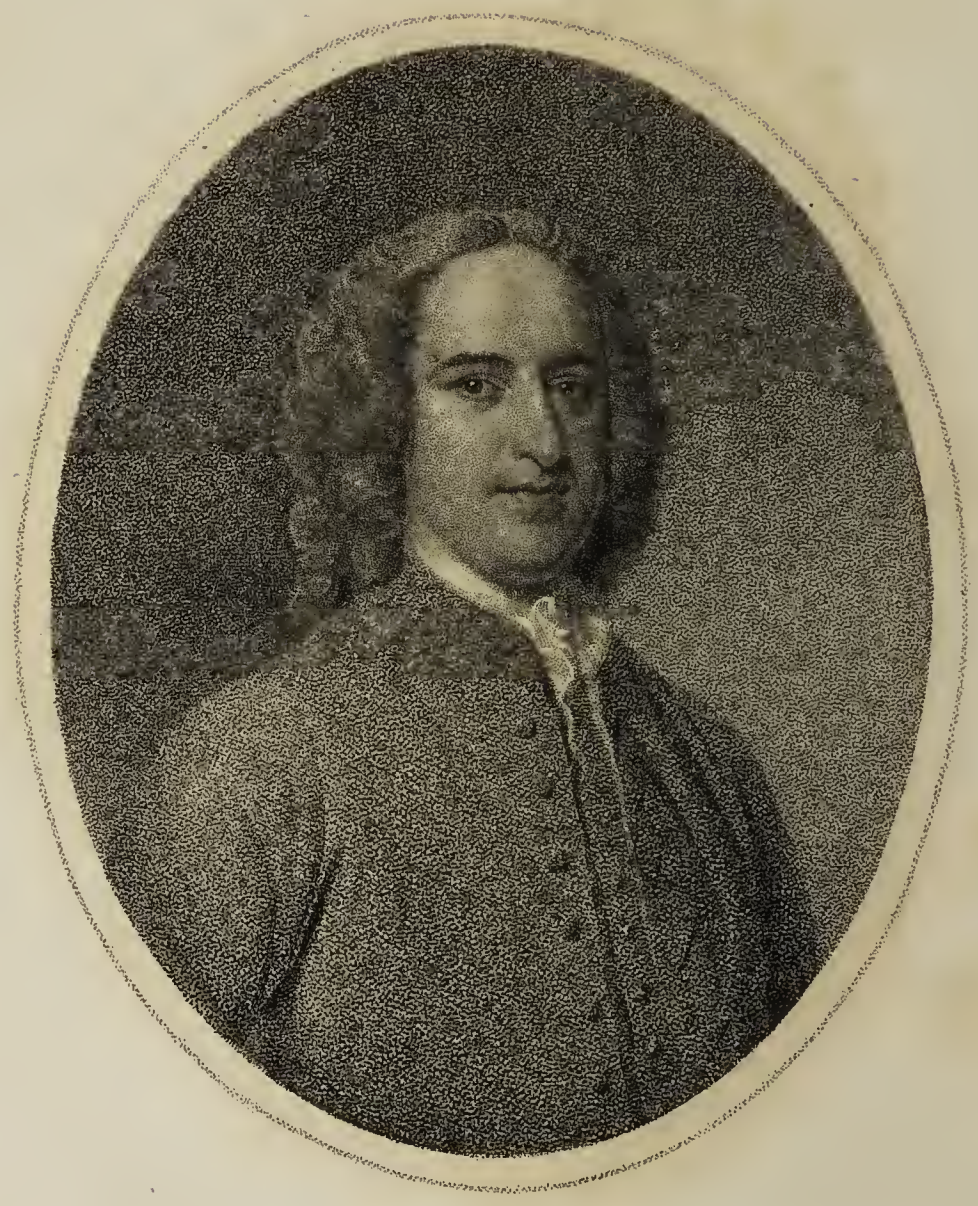
The Marquis of Stafford.



ROBERT NETTLETON Esq.r

of Camberwell in the County of Surry.

Engraved by Wm. Evans from an original Painting
in the Possession of Thomas Raikes Esq.r

16766

TRANSACTIONS

OF THE

SOCIETY

INSTITUTED AT LONDON,

FOR THE

ENCOURAGEMENT

OF

ARTS, MANUFACTURES, and COMMERCE;

WITH THE

PREMIUMS offered in the YEAR 1800.

VOL. XVIII.

LONDON:

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Sold by the REGISTER, at the SOCIETY'S HOUSE, in the ADELPHI; and by Messrs. ROBSON, J. WHITE, BECKET, JOHNSON, CADELL and DAVIES, ELMSLEY and BREMNER, WALTER, RICHARDSON, DEBRETT, SEWELL, and TAYLOR.

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PREFACE.

THE addition of a greater number of very respectable persons as Members of the Society during the last Session than in many preceding, shews in a strong point of view the high estimation in which this Society stands with the World, at a period of forty-six years from its formation. The number of Candidates yet offering themselves, makes it appear that the ardour for improvements in the Arts, Manufactures, and Commerce of Great Britain and her Colonies, continues to act vigorously on the mind; and a consideration of the infinite advantages which the Public have derived from this Society, affords the pleasing prospect of its flourishing to the remotest ages.

The Funds of the Society have this Session received an addition of five hundred pounds from the legacy of the late Robert Nettleton, Esq. of Camberwell, whose portrait, from respect to his memory, the Society have ordered to form the Frontispiece of the present Volume.—They have also directed the following short account of the life of this excellent character to be added.

Mr. Nettleton was born at Hull, about the year 1694. His Father was a respectable merchant there, and successively discharged the offices of Chamberlain, Sheriff, and Mayor, in that town. He had a brother named James, who was a merchant at Stockholm, and perished by a remarkable accident, being blown up in a merchant-ship lying there, on board which the British factory were dining to celebrate the King's birth-day. Mr. Nettleton, on his first entrance into business, resided at Konigsberg in Prussia, and afterwards removed to St. Petersburg, where he was personally known

to

to Peter the Great, its illustrious founder; from thence he came to settle in London, about the year 1735.

Blessed with a good natural understanding, improved by a classical education, he was conversant with the best Greek and Latin authors, and attentive to mathematical and other scientific studies. In all his transactions, he was most upright and honourable; in his turn of mind, calm and benevolent; warmly interested for the welfare of his country, kind and hospitable to his friends, and of so bountiful a disposition to the poor, that, during the whole course of his business, he set aside a tenth part of his profits for the purposes of charity; which plan he so much extended in his latter years, as to give away a fourth, or even a larger portion of his income.

Being related to the family of the famous Andrew Marvel, Esq. and desirous of recommending that patriotic character

to the imitation of other men, he placed a marble tablet to his memory in the church of St. Giles's in the Fields.

Mr. Nettleton presided for 25 years as Governor of the Russia Company in London, and was for some years a Director of the Bank of England; in which situations his disinterested conduct and distinguished moderation gained him the good opinion and respect of all persons with whom he had any intercourse.

Mr. Nettleton married Anne, one of the daughters of Sir Edward Becher, who was Lord-Mayor of London in 1729, by whom he left no issue: he died in July 1774, and lies interred in the parish of Camberwell.

He left by his will a certain sum of money to be invested in the stocks, as a part of the provision for his Widow; and after her death, he bequeathed £3,500 thereof to the following public charities and institutions:

The

The Small-pox Hospital	£.1000 0 0
Merchant Seamen's Corporation	1000 0 0
London Hospital	500 0 0
St. Thomas's Hospital . .	500 0 0
The Society for the encouragement of Arts, Manufactures and Commerce, of which he had been early a Member	500 0 0

The Widow of Mr. Nettleton survived him until the month of November, 1799; and, on her decease, the above-mentioned legacies were discharged by his remaining executor and trustee, Thomas Raikes, Esq. of New-Broad-Street, London.

A character so respectable as that of Mr. Nettleton will long be admired by posterity, and venerated by his countrymen.

The business of the Society, during the last Session, suffered some interruption by the loss of their late worthy Secretary, Mr. Samuel More, who died on the 11th of October, 1799, less a martyr to age than to infirmity, being worn out with almost perpetual attacks of the

gout, with which he had been for many years very heavily afflicted. His unwearied zeal for the interests of the Society, his great abilities in the execution of an office to which he had been enthusiastically devoted for near 30 years, and his extensive knowledge of every subject connected with the Institution, are well known, and must be gratefully acknowledged.

There is great reason to believe that some of the first Mechanicians and Manufacturers of this country have at different times been indebted to him for useful hints and observations. It is not proposed to enter here into the biography of this very excellent Officer, whose private worth was not inferior to his public virtues, because it is expected that a full account of him will be prefixed to the publication of some valuable papers, which, it is said, he has bequeathed to the World. He was buried in a family vault, belonging to the Chapel in the Broad-Way, Westminster, in the parish of

of St. Margaret's. His executors are George Philips Towry, Esq. one of the Commissioners of the Victualling-Office, and William Newcombe, Esq. of the Bank.

The loss of a man so able and so long-experienced in office, was naturally attended with some little embarrassment to the Society, more particularly as the election of his successor did not take place for some months after his decease; but the active exertions of Mr. Thomas Taylor, the assistant Secretary, well known for his endeavours to disseminate the Philosophy of Plato, aided by the voluntary assistance of the late Mr. George Wilson, of Bedford-street, Covent Garden, prevented impediments to the business of the Society.

The subsequent death of Mr. Wilson, who united the accomplishments of the gentleman and the scholar with the offices of friendship, will long call forth a tributary sigh from every person who was favoured with his acquaintance. No

man

man ever had a greater regard for the Society, or was more attentive to its honour and its interest.

The present Secretary to the Society was elected in February last, but was scarcely called to active business till the month of March. His entrance upon this office will naturally be considered an arduous undertaking, when the merits and comprehensive abilities of his predecessor are remembered ; but some candour and indulgence, on such an occasion, he certainly has a right to claim from the Society and the Public. In this and other kingdoms, he has had the opportunity to investigate such matters as are the peculiar objects of the Society ; and his mind appears to be strongly impressed with a wish to discharge the duties of his office with propriety, energy and attention.

The death of the late Secretary, unavoidably occasioned some delay in the publication of the present volume. The arrangements of it will be found in nearly the

the same order, as in preceding years, and the Premiums not much different: some alterations in them are proposed to take place in the next Volume; and the patrons of the arts, and all ingenious men, are requested to address to Mr. Charles Taylor, the present Secretary of the Society, any hints of new Premiums for objects beneficial to the British Empire.

It is to be remembered, that the establishment of the Society is not on narrow views, or selfish interests. The series of Paintings by Mr. Barry, and the Models for which Premiums have been given, are open to public inspection *gratis*, and the grand object of the Society is the public good.

Under the class of Agriculture, will be found two new Premiums, this year, of very material consequence; namely, one for Spring-wheat, class 88; the other for early Beans, class 91. When the uncertainty of our climate is considered, and the frequent difficulties which the farmer meets with in getting his seed properly

perly in the ground in the autumn, or early winter months, it will be judged of great importance to learn the best methods of producing good crops from wheat sown in the spring season, and to ascertain the kinds most proper for the purpose. The Premium for Horse-beans is intended to point out the earliest varieties, with a view to allow as much time as possible to render land in good condition, for wheat to be sown thereon the same year. Upon similar well-grounded principles, the true spirit of agriculture is encouraged, extended, and improved.

In the department of Mechanicks, Class 218 *, the Premium for cleansing Chimneys, which had been some years omitted, will be found renewed. The great number of miserable objects which the late Mr. George Wilson, above mentioned, had met with in his practice, whose disorders and infirmities he had traced to their source, and found to originate from the common methods of sweeping

sweeping chimneys by children, called forth his usual philanthropy to seek out for some invention to answer the purpose, and to be less injurious to mankind. It is hoped that the Society's effort at this time will be successful.

The papers and communications of the present Volume are in general disposed in the usual manner, under their respective classes. The three last Papers, under the title of Additions in Agriculture, were thus placed, because the accounts had not been fully completed by the Gentlemen who presented them, before the preceding articles in some of the other Classes had been printed off.

Under the class of Agriculture, at the commencement of the Volume, it will be found that the Right Honourable the Marquis of Titchfield has made great and very commendable exertions in planting Acorns.

Thomas Johnes, Esq. has been very successful in planting Larch-trees: few trees are more generally useful, or more durable

durable than the Larch. It is to be observed, that this Gentleman has not confined himself to this kind of timber only; but has entered into an immense extent of general plantations, of which it is probable notice will be taken at a future period.

The communication of the Rev. William Smith, on the planting of Timber-trees, will be found clear and satisfactory: it is pleasing to announce, that the great national object of raising timber has been lately much attended to in other parts of the kingdom.

Orchardists will receive much valuable information from Mr. Lake's paper, which contains an accurate detail of practical knowledge on the subject of Orchards.

Mr. John Cartwright's paper upon the culture of Beans and Wheat, well deserves attention, both from the mode of execution, and because such a system of agriculture precludes the necessity of losing a crop by a summer fallow; the beans

beans leaving the land in a state fit for wheat to be sown thereon the same year.

The culture and qualities of English Rhubarb are fully ascertained by the account furnished by Mr. Thomas Jones on this subject.

The mode of improving Waste Moors has been laid down with great judgement and discrimination in Mr. John Mire-house's paper on the cultivation of Waste Land, and will form a good example to be followed in similar circumstances. The mind is here naturally led to consider the immense benefit which would accrue to this nation, if attention were paid to the general improvement of the waste land in Great Britain. It may be proved, from actual observation, that there is no land, however in appearance sterile or unfavourable, but is capable of great improvement, at a less expence than is generally conceived. In this case it becomes highly necessary to judge from comparison

comparison, what are the best articles for growth in particular soils and situations, to observe the natural products of the soil, and to take Nature by the hand in her several operations. It must have given peculiar pleasure, to have lately witnessed, in several parts of this kingdom, large crops of wheat and oats waved by the gentle breeze, in varied forms, upon lands which had been deemed inaccessible morasses, or had remained uncultivated for ages.

It is earnestly wished that similar examples may become objects of universal attention and imitation.

The improvements of the Rev. H. B. Dudley, in gaining Land from the Sea, appear to have been conducted with great judgment, and contribute, upon the principles above mentioned, to the advantages of this kingdom.

Mr. Jones, in his paper upon Opium, has clearly proved that Opium of excellent quality may be produced in Great Britain. His observations confirm experiments

periments, which had been previously made upon a smaller scale by Dr. De Salis.

Whatever the public opinion may be upon the benefits likely to arise to this country, from cultivating Poppies in England, for the production of Opium, yet it is well to have clearly ascertained that they will yield here large quantities of good Opium.

At the head of Mechanicks, the late Mr. Bowes's discovery of a Quarry of Mill-stones in Wales, resembling the French Burrs, is of material consequence, especially on consideration of the precarious situation of this country, when lately dependent upon France for so necessary an article. True national policy will always endeavour to produce within the limits of our own country, whatever is necessary for our maintenance and support.

The public attention has been much engaged about the acquisition of a Flour-mill, so constructed as to enable Families

or small Villages to grind their own corn at little expence. Those persons who reside in the country, at a distance from a common Corn-mill, know the necessity of such an invention; and to such, it is expected the Hand-mill, invented by Mr. Thomas Rustall will be found of great importance.

The Bolter invented by him, and which is also described, will not only answer the purpose of separating flour from bran, but will be very advantageous to Colour-makers, Druggists, and others in those branches of business where articles of value require to be sifted, or where noxious particles should be avoided in the operation.

The management of heat has been lately a topic of general conversation, and many attempts have been made to improve Ovens, and to save Fuel.

The Oven lately invented by Mr. Holmes, is well adapted for economy, and the service of private families. The

Society

Society have been very attentive to examine its advantages, by repeated experiments, the results of which have declared much in its favour. It is not sufficient, in mechanical inventions, that they will succeed with care; it is also necessary that no additional trouble shall arise to the servants employed about them; otherwise the best inventions will be liable to miscarry. No previous preparation is required in the management of Mr. Holmes's Oven, no extra fire to be made underneath it, or flues to be cleared from smoke and ashes.

If once well fixed in brick-work, it heats with the morning fire, and retains during the whole day, by its contact with the common fire, sufficient heat for general culinary purposes. It will probably be deemed as essential to a family kitchen as the most common utensils there.

The repeated accidents which arise to horses drawing loaded carts, have induced

the Society to consider the means of preventing them ; and with this view they have inserted Mr. John Snarts's invention, which will also afford some advantages, by admitting an additional extent to the body of the cart for loads which require room.

A very ingenious Chest-lock, by Mr. Arkwright, will be found to deserve the public notice, it being one of the best means hitherto devised for securing property against picklocks or unfaithful servants.

Mr. Bullock's Lever Lock-bolt is peculiarly well contrived for folding-doors, and for saving trouble to domestics.

The great dangers which arise to passengers in carriages, from horses taking fright, occasioned a Premium to be offered for preventing such accidents : this called forth the ingenuity of Mr. Davis, who, by very curious mechanism, has contrived to detach the horses instantly when required from carriages, and to

stop

stop at the same time the motion of the fore-wheels.

Mr. Clulow's figured Ribband-loom will suggest improvements in the manufacture of Ribbands; many other ingenious contrivances in the figured line of weaving have been completed in other parts of the kingdom.

The astonishing inventions of his Grace the Duke of Bridgewater, on his Canals, are beyond the conceptions of those persons who have not been eye-witnesses to their powers and effects. The Rev. H. Egerton has obligingly favoured the Society, this year, with a description and plan of that stupendous undertaking, the subterraneous inclined plane, projected by, and executed under the immediate inspection of his Grace.

The memory of his Grace will ever be respected as the founder of Inland Navigation in this kingdom; and his clearness of understanding, and strength

of

of mind, have enabled him to conquer difficulties deemed insuperable.

In testimony of great respect for his Grace's merits, the Society have, this Session, presented to him their Gold Medal, thus inscribed: *To his Grace the Duke of Bridgwater, for his great exertions in Inland Navigations.*

It is scarcely credible to what an extent of noble emulation the Society have from time to time given rise, or to form a sufficient estimate of the numerous advantages which the public have ultimately derived from them.

The works of a Barry and a Bacon, which decorate the great Room of the Society, are examples of these exertions. The bold enterprise of Mr. Mackenzie, in traversing the wilds of North America, related in this Volume, is a similar instance in another line of trial; and many others could be adduced.

Under the head of Additions in Agriculture, Mr. Bucknall's paper, relative

to

to the causes of Blight on Fruit-trees, may be considered as a continuation of that series of observations on Orcharding, which that indefatigable and attentive Gentleman has for many years furnished to the Society: the present paper throws much light on the destructive powers of insects.

The observations by Mr. John Taylor, upon the Beet-plant, and the best methods practised in Germany, for extracting Sugar from its root, became an object of the Society's attention, from a consideration of the various purposes, in Arts and Manufactures, to which its leaves, its juices, and its roots, can be applied. It is a material branch of the Society's institution to elucidate the advantages which Great Britain actually does possess, or to point out such as she may procure within herself, without being dependent upon Foreign Nations; and in this view the culture of the Beet-plant may be of great consequence.

The

The very valuable Paper received from Mr. Wakefield, on the powers of Steam, in promoting Vegetation, contains a minute detail of many curious facts, extremely interesting to the naturalist, along with an accurate plan of a Steam-House constructed in the manner he recommends. A variety of remarks on the theory of this process, which have been communicated by him to the Secretary, are at present omitted, owing to the Volume containing already a greater quantity of letter-press than usual, and the account now given being of itself considerable in extent.

Mr. Wakefield's general knowledge in agriculture and horticulture is exemplified by accurate practice, and admirably illustrated by his extensive improvements upon Trafford-moss, near Manchester, which will be found well worthy the inspection of those persons who visit that neighbourhood.

Amongst a variety of information on different subjects received by the Society, but

but not inserted in the present Volume, the Rev. W. Hoskins's discovery of an Iron-mine in Cornwall, the Ore of which is proper for making excellent Steel, should not pass unnoticed. By Mr. Hoskins's account, this Ore contains from 25 to 30 per cent. of iron, much argillaceous earth, small quantities of gold, silver and copper, and a little calcareous earth: he stated that the specific gravity of the iron is in the proportion of 7,654, estimating water at 1000; that he knew no other English Ore capable of producing Steel equal to his specimens; that the metal retains its malleability, whether hot or cold, and was in either case equally tough; that the mine extends superficially above five acres, is within 3 feet of the surface, and in a load from 40 to 60 feet in depth. In support of his observations, he laid before the Society various excellent steel instruments, made from this iron, and authentic certificates of its merit.

Before this summary account of the transactions of the Society is concluded, it is proper to notice the death, in August last, of the worthy and ingenious Mrs. Montague, who had been a member of the Society above fifteen years.

The present Session has added some Ladies of great merit to the list of Members; and, doubtless, more will wish to be elected, when it is remembered that female accomplishments have been long favoured by the attentions and rewards of the Society. The funds of the Society are in a flourishing state; and the ingenious of both sexes, and of every description, are invited to lay their inventions or improvements before the Society, who extend their liberality far beyond the objects published in their list of Premiums. True merit will ever meet with their patronage and encouragement; and the names of those persons whose endeavours receive their sanction, will be handed down to posterity, as contributors to the public welfare of their country.

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PREMIUMS

OFFERED BY THE

SOCIETY

INSTITUTED AT LONDON,

FOR THE ENCOURAGEMENT OF

ARTS, MANUFACTURES,

AND

COMMERCE,

IN

THE YEAR M.DCCC.

TO THE PUBLIC.

ADELPHI-BUILDINGS,
April 10, 1800.

THE chief objects of the attention of the Society for the encouragement of Arts, Manufactures, and Commerce, in the application of their Rewards, are, ingenuity in the several branches of POLITE and LIBERAL ARTS, useful Discoveries and Improvements in AGRICULTURE, MANUFACTURES, MECHANICKS, and CHEMISTRY, or the laying open any such to the Public; and, in general, all such useful Inventions, Discoveries, or Improvements (though not mentioned in the Book of Premiums), as may appear to have a tendency to the advantage of Trade and Commerce. The Society therefore, in pursuance of their plan, propose to bestow the following Premiums.

Premiums for Planting and Husbandry.

Class 1. ACORNS. For having set, between the first of October, 1799, and the first of April, 1800, the greatest quantity of land, not less than ten acres, with Acorns, with or without seeds, cuttings, or plants of other trees, at the option of the Candidate; and for effectually fencing and preserving the same, in order to raise timber; the GOLD MEDAL.

2. For the second greatest quantity of land, not less than five acres, set agreeably to the above conditions, the SILVER MEDAL.

CERTIFICATES of setting agreeably to the above conditions, and that there are not fewer than three hundred young Oaks on each acre, to be delivered to the Society on or before the first Tuesday in December, 1800.

3, 4. The same premiums are extended one year further.

CERTIFICATES to be produced on or before the first Tuesday in December, 1801.

5, 6. The same premiums are extended one year further.

CERTIFICATES to be produced on or before the first Tuesday in December, 1802.

7, 8. The same premiums are extended one year further.

CER-

CERTIFICATES to be produced on or before the first Tuesday in December, 1803.

N. B. It is the particular wish of the Society, that such lands only as are not calculated for growing Corn should be employed for the purposes specified in this advertisement.

9. RAISING OAKS. To the person who shall have raised, since the year 1796, the greatest number of Oaks, not fewer than five thousand, either from young plants or acorns, in order to secure a succession of oak timber in this kingdom; the GOLD MEDAL.

10. For the next greatest number, not fewer than three thousand, the SILVER MEDAL.

CERTIFICATES that there were on the land, at least the number of young Oak-trees required, in a thriving condition, two years after the planting, with an account of the methods pursued in making and managing the plantation, to be produced to the Society on or before the first Tuesday in January, 1801.

11, 12. The same premiums are extended one year further.

CERTIFICATES to be produced on or before the first Tuesday in January, 1802.

13, 14. The same premiums are extended one year further.

CERTIFICATES to be produced on or before the first Tuesday in January, 1803.

N. B. It is the particular wish of the Society, that such lands only as are not calculated for growing Corn, should be employed for the purposes specified in this advertisement.

15. ASCERTAINING THE BEST METHOD OF RAISING OAKS. To the person who shall ascertain in the best manner, by actual experiments, the comparative merits of the different modes of raising Oaks for timber, either from acorns set on land properly grubbed and tilled; from acorns sown at random among bushes, fern, or other cover; or from young plants, previously raised in nurseries, and transplanted; regard being had to the expence, growth, and other respective advantages of the several methods; the GOLD MEDAL.

The ACCOUNTS, and proper CERTIFICATES that not less than one acre has been cultivated in each mode, to be produced to the Society on or before the first Tuesday in November, 1800.

16. The same premium is extended one year further.

The ACCOUNTS and CERTIFICATES to be produced on or before the first Tuesday in November, 1801.

17. CHESNUTS. For having sown or set, between the first of October, 1799, and the first of April, 1800, the greatest quantity of dry loamy land, not less than six acres, with Spanish Chesnuts, with or without seeds, cuttings, or plants of other trees adapted to such soil, at the option of the Candidate; and for effectually fencing and preserving the same, in order to raise timber; the GOLD MEDAL.

18. For

18. For the second greatest quantity, not less than four acres, the SILVER MEDAL.

CERTIFICATES of sowing or setting agreeably to the above conditions, and that there are not fewer than three hundred Chesnut plants, in a thriving state, on each acre, to be delivered to the Society on or before the first Tuesday in November, 1800.

19, 20. The same premiums are extended one year further.

CERTIFICATES to be delivered on or before the first Tuesday in November, 1801.

21, 22. The same premiums are extended one year further.

CERTIFICATES to be delivered on or before the first Tuesday in November, 1802.

23, 24. The same premiums are extended one year further.

CERTIFICATES to be delivered on or before the first Tuesday in November, 1803.

25. ELM. For having planted the greatest number of the English Elm, not less than eight thousand, between the twenty-fourth of June, 1798, and the twenty-fourth of June, 1799; and for the having effectually fenced and preserved the same, in order to raise timber; the GOLD MEDAL.

26. For the second greatest number, not less than five thousand, the SILVER MEDAL.

CERTIFICATES of the having planted agreeably to the above conditions, that the plants were in a healthy and thriving state two years at least after making the plantation, and specifying the distance of the plants, to be delivered to the Society on or before the first Tuesday in April, 1801.

27, 28. The same premiums are extended one year further.

CERTIFICATES to be produced on or before the first Tuesday in April, 1802.

29, 30. The same premiums are extended one year further.

CERTIFICATES to be produced on or before the first Tuesday in April, 1803.

31, 32. The same premiums are extended one year further.

CERTIFICATES to be produced on or before the first Tuesday in April, 1804.

33. LARCH. For having planted out between the twenty-fourth of June, 1797, and the twenty-fourth of June, 1798, the greatest number of Larch-trees, not fewer than five thousand; and for having effectually fenced and preserved the same, in order to raise timber; the GOLD MEDAL.

34. For the next greatest number, not fewer than three thousand, the SILVER MEDAL.

CER-

CERTIFICATES of the number of plants, that they were in a healthy and thriving state two years at least after they were planted out, with a general account of the methods used in making the plantation, to be delivered to the Society on or before the last Tuesday in December, 1800.

35, 36. The same premiums are extended one year further.

CERTIFICATES to be produced on or before the last Tuesday in December, 1801.

37, 38. The same premiums are extended one year further.

CERTIFICATES to be produced on or before the last Tuesday in December, 1802.

39, 40. The same premiums are extended one year further.

CERTIFICATES to be produced on or before the last Tuesday in December, 1803.

41, 42. The same premiums are extended one year further.

CERTIFICATES to be produced on or before the last Tuesday in December, 1804.

N. B. The Larch-trees may be either planted, mixed with other trees, or by themselves, as may best suit the convenience of the planter.

43. SILVER FIR. For having planted out, between the twenty-fourth of June, 1796, and the twenty-fourth of

of June, 1797, in a mixed plantation of Forest-trees, or separate, according to the option of the Candidate, the greatest number of Silver Firs, not fewer than two thousand; and for having effectually fenced and preserved the same, in order to raise timber; the GOLD MEDAL.

44. For the next greatest number, not fewer than one thousand, the SILVER MEDAL.

CERTIFICATES of the number of plants, that they were in a healthy and thriving state two years at least after they were planted out, with a general account of the methods used in making the plantation, to be delivered to the Society on or before the last Tuesday in December, 1800.

45, 46. The same premiums are extended one year further.

CERTIFICATES to be produced on or before the last Tuesday in December, 1801.

47, 48. The same premiums are extended one year further.

CERTIFICATES to be produced on or before the last Tuesday in December, 1802.

49. OSIERS. To the person who shall have planted, between the first of October, 1799, and the first of May, 1800, the greatest quantity of land, not less than five acres, with those kinds of Willows, commonly known by the names of Osier, Spaniard, New-kind, or French, fit for the purpose of basket-makers, not fewer than twelve thousand plants on each acre; the GOLD MEDAL, or THIRTY GUINEAS.

50. For

50. For the second greatest quantity of land, not less than three acres, the SILVER MEDAL, or TEN GUINEAS.

CERTIFICATES of the planting, and that the plants were in a thriving state five months at least after the planting, to be produced to the Society on or before the last Tuesday in November, 1800.

51, 52. The same premiums are extended one year further.

CERTIFICATES to be produced on or before the last Tuesday in November, 1801.

53. ALDER. For having planted, in the year 1797, the greatest number of Alders, not less than three thousand, the GOLD MEDAL.

CERTIFICATES of the number of plants, and that they were in a thriving state two years at least after being planted, to be delivered to the Society on or before the last Tuesday in December, 1800.

54. The same premium is extended one year further.

CERTIFICATES to be delivered on or before the last Tuesday in December, 1801.

55. The same premium is extended one year further.

CERTIFICATES to be delivered on or before the last Tuesday in December, 1802.

56. The same premium is extended one year further.

CERTIFICATES to be delivered on or before the last Tuesday in December, 1803.

57. ASH.

57. ASH. For having sown or set, in the year 1797, the greatest quantity of land, not less than six acres, with Ash for timber, with or without seeds, cuttings, or plants of such other trees as are adapted to the soil; the GOLD MEDAL.

58. For the next greatest quantity, not less than four acres, the SILVER MEDAL.

CERTIFICATES of the sowing or setting agreeably to the above conditions; that there are not fewer than one hundred Ash plants on each acre, in a thriving and healthy condition, two years at least after the sowing or setting, with a general account of the methods used in making the plantation; to be delivered to the Society on or before the last Tuesday in December, 1800.

59, 60. The same premiums are extended one year further.

CERTIFICATES to be delivered on or before the last Tuesday in December, 1801.

61, 62. The same premiums are extended one year further.

CERTIFICATES to be delivered on or before the last Tuesday in December, 1802.

63, 64. The same premiums are extended one year further.

CERTIFICATES to be delivered on or before the last Tuesday in December, 1803.

65,

65, 66. The same premiums are extended one year further.

CERTIFICATES to be delivered on or before the last Tuesday in December, 1804.

67. TIMBER-TREES. To the person who shall have enclosed, planted, or sown, the greatest number of acres, not less than ten, with the best sorts of Forest-trees, adapted to the soil, for timber, between the firſt of October, 1796, and the first of May, 1798; the GOLD MEDAL.

An account of the methods used in making the plantations, and of the nature of the soil, together with proper CERTIFICATES that the trees were in a thriving and healthy state two years at least after making the plantation, to be delivered to the Society on or before the first Tuesday in November, 1800.

68. The same premium is extended one year further.

The ACCOUNTS and CERTIFICATES to be delivered to the Society on or before the first Tuesday in November, 1801.

69. The same premium is extended one year further.

The ACCOUNTS and CERTIFICATES to be delivered to the Society on or before the first Tuesday in November, 1802.

70. The same premium is extended one year further.

The ACCOUNTS and CERTIFICATES to be delivered to the Society on or before the first Tuesday in November, 1803.

N. B. With

N. B. With the above Forest-trees, the seeds, cuttings, or plants, of such other trees as are adapted to the soil, and proper for underwood, may or may not be intermixed.

71. PLANTING ORCHARDS. To the person who shall plant an Orchard after the month of August in the year 1797, in the most judicious manner, not less than four acres; the GOLD MEDAL, or FIFTY GUINEAS.

72. For the next in merit, the SILVER MEDAL, or THIRTY GUINEAS.

The proof of the value of the improvement of the Orchard shall depend on the clear product of the greatest quantity of fine marketable fruit, to be produced during three successive years after the year 1813, and sold at any public market in England or Wales. Each person who proposes to become a Candidate for these Premiums must send an account of the number of trees, their culture, pruning, and every circumstance which can in the least throw any light on the subject; which information will be registered, with a view to form a system of rational culture.

73. And that Gentlemen may be induced to come forward, and to make and preserve such plantation,—The person who can produce an ORCHARD which, at the end of three years after planting, shall shew the greatest promise of success, shall be entitled to the GOLD MEDAL, or THIRTY GUINEAS.

The merits of the two first-mentioned Premiums being to be ascertained by the fruit; the merit of the third premium must be ascertained by the judicious number of trees planted, the straitness, clearness, and freedom of growth of the

the several trees; and that all the young branches run free, and at due distance from each other, without any galling or canker.

CERTIFICATES of the forming the Orchard, the soil and aspect of the plantation, the sale and product of the fruit for which the claims for the Premiums, Classes 71 and 72, are intended to be made, must be delivered to the Society on or before the first Tuesday in November, 1816: and the Certificate in claim of the Premium, Class 73, must be delivered to the Society on or before the first Tuesday in November, 1800.

N. B. However expert the Orchardist may be in general information and attention, much will depend on soil, exposure, culture, and an easy communication to convey the fruit to market; for every field, however valuable in other respects, may not be proper for an Orchard.

Any wood the Orchardist may choose to raise for shelter to such plantation, is not to be measured as part of the Orchard, as the wood will more than support its own expence.

74, 75, 76. The foregoing Premiums for Orchards, from Class 71 to Class 73 inclusive, are extended one year further. The claims for the Premiums, Classes 71 and 72, to be delivered to the Society on or before the first Tuesday in November, 1817; and the Certificate in claim of the Premium, Class 73, must be delivered on or before the first Tuesday in November, 1801.

*** *The Candidates for planting all kinds of Trees are to certify, that the respective Plantations are properly fenced and secured, and particularly to state the condition the plants were in at the time of signing such Certificate.*

Any

Any information which the Candidates for the foregoing Premiums may choose to communicate, relative to the methods made use of in forming the Plantation, or promoting the growth of the several Trees, or any other observations that may have occurred on the subject, will be thankfully received.

77. SECURING PLANTATIONS OF TIMBER-TREES. To the person who shall give to the Society the most satisfactory Account, founded on experience, of the most effectual and least expensive method of securing young plantations of Timber-trees from Hares and Rabbits, as well as Sheep and larger cattle, which at the same time shall be least subject to the depredations of wood-stealers; the SILVER MEDAL, or TWENTY GUINEAS.

The ACCOUNTS, and CERTIFICATES of the efficacy of the method, to be produced to the Society on or before the first Tuesday in November, 1800.

78. The same premium is extended one year further.

The ACCOUNTS and CERTIFICATES to be produced on or before the first Tuesday in November, 1801.

79. PREVENTING THE BLIGHT ON FRUIT-TREES. To the person who shall discover to the Society the best and most effectual method of preventing the Blight on Fruit-trees, superior to any hitherto known or practised, and verified by actual and comparative experiments; the GOLD MEDAL, or THIRTY GUINEAS.

The ACCOUNTS, with proper CERTIFICATES, to be delivered to the Society on or before the second Tuesday in November, 1800.

80. The

80. The same premium is extended one year further.

The ACCOUNTS and CERTIFICATES to be delivered on or before the second Tuesday in November, 1801.

81. The same premium is extended one year further.

The ACCOUNTS and CERTIFICATES to be delivered on or before the second Tuesday in November, 1802.

82. TAKING OFF THE ILL EFFECTS OF BLIGHTS. To the person who shall discover to the Society the best and most effectual method of taking off the ill effects of Blights on Fruit-trees, superior to any hitherto known or practised, and verified by actual and comparative experiments; the GOLD MEDAL, or THIRTY GUINEAS.

The ACCOUNTS and CERTIFICATES to be delivered to the Society on or before the first Tuesday in February, 1801.

83. COMPARATIVE CULTURE OF WHEAT. For the best set of experiments, made on not less than eight acres, four of which to be sown broad-cast, and four drilled, to ascertain whether it is most advantageous to cultivate Wheat by sowing it in the common broad-cast way, or by drilling it in equidistant rows, hoeing the intervals; the GOLD MEDAL, or the SILVER MEDAL and TWENTY GUINEAS.

It is required that an account of the expence attending each mode of culture, with proper CERTIFICATES of the nature and condition of the land on which the experiments are made, together with an account of the produce of the Corn, be produced to the Society on or before the first Tuesday in February, 1801.

84. The same premium is extended one year further.

The ACCOUNTS and CERTIFICATES to be delivered on or before the first Tuesday in February, 1802.

85. COMPARATIVE CULTURE OF WHEAT. For the best set of experiments, made on not less than eight acres of land, four of which to be sown broad-cast, and four dibbled, to ascertain whether it is most advantageous to cultivate Wheat by sowing it in the common broad-cast way, or by dibbling it in equidistant rows, hoeing the intervals; the GOLD MEDAL, or the SILVER MEDAL and THIRTY GUINEAS.

It is required that an account of the expence attending each mode of culture, with proper certificates of the nature and condition of the land on which the experiments are made, together with an account of the produce of the Corn, be produced to the Society on or before the first Tuesday in February, 1801.

86. The same premium is extended one year further.

The ACCOUNTS and CERTIFICATES to be delivered on or before the first Tuesday in February, 1802.

87. BEANS AND WHEAT. To the person who shall have planted or drilled, between the first of December, 1798, and the first of April, 1799, the greatest quantity of land, not less than ten acres, with Beans, and shall have sown the same land with Wheat in the same year 1799; TWENTY GUINEAS.

It is required that an account of the sort and quantity of Beans, the time of planting or drilling, and of reaping or mowing them, the produce per acre threshed, the

the application of the straw, the expence of planting or drilling, hand or horse hoeing, the distance of the rows, and the quality of the soil, together with CERTIFICATES of the number of acres, and that the land was actually sown with Wheat in the year 1799, be produced on or before the first Tuesday in November, 1800.

88. SPRING WHEAT. To the person who, in the year 1800, shall cultivate the greatest quantity of Spring Wheat, not less than ten acres, the SILVER MEDAL, or TWENTY GUINEAS.

It is required that the time of sowing and reaping be noticed; also a particular account of the species, cultivation, and expence attending it, with proper certificates of the nature and condition of the land on which the experiments were made, and the name of the crop, if any, which the same land bore the preceding year, together with an account of the produce, the weight per Winchester bushel, and a sample, not less than a quart, be produced to the Society on or before the second Tuesday in December, 1800.

N. B. The Society have been informed from respectable authority, that some of this kind of Wheat was sown in the year 1799, so late as the first week in May, and reaped in less than four months afterwards. It is supposed that the cultivation of Spring Wheat would not only allow more time to till the land, but less for the growth of weeds; thus rendering the Wheat crop as clean as a Barley crop, and exhausting the soil much less than by autumnal sowing.

The ACCOUNTS and CERTIFICATES to be delivered on or before the second Tuesday in December, 1800.

89. The same premium is extended one year further.

The ACCOUNTS and CERTIFICATES to be delivered on or before the second Tuesday in December, 1801.

90. The same premium is extended one year further.

The ACCOUNTS and CERTIFICATES to be delivered on or before the second Tuesday in December, 1802.

91. BEANS. To the person who, in the year 1800, shall discover and cultivate, either by the drill or dibbling method, on not less than five acres, a species of Horse Beans or Tick Beans, that will ripen their seeds before the first of August, the SILVER MEDAL, or TWENTY GUINEAS.

It is required that a particular account of the Bean, the cultivation, and the expence attending it, with proper certificates of the nature and condition of the land on which the experiments are made, together with an account of the produce, the weight per Winchester bushel, and a sample of not less than a quart, be produced to the Society on or before the first Tuesday in December, 1800.

It is apprehended that if a Bean should be brought into cultivation with the habits of the Hotspur or other early Peas, that it would, in a great measure, escape the danger arising from the Collier insect, or other insects, and allow more time for the farmers to till the land for the subsequent crop of Wheat.

The ACCOUNTS and CERTIFICATES to be delivered on or before the first Tuesday in December, 1800.

92. The

92. The same premium is extended one year further.

The ACCOUNTS and CERTIFICATES to be delivered on or before the first Tuesday in December, 1801.

93. TURNEPS. For the best account of experiments made on at least six acres of land, to determine the comparative advantage of the drill or broad-cast method in the cultivation of Turneps; the GOLD MEDAL, or the SILVER MEDAL and TEN GUINEAS.

The ACCOUNTS, with proper CERTIFICATES, to be delivered on or before the third Tuesday in March, 1801.

It is required that one half of the land be drilled, and the other half sown broad-cast.

94. VEGETABLE FOOD. For the best account, confirmed by experiments, of the Vegetable Food (Cabbages and Turneps excepted), growing in the months of March and April, that will most increase the milk in Mares, Cows, and Ewes, at that season; provided such food can be cultivated at an expence that will admit of its being applied to the above purposes; the GOLD MEDAL, or the SILVER MEDAL and TEN GUINEAS.

CERTIFICATES to be produced on or before the second Tuesday in November, 1800.

95. CULTIVATING ROOTS AND HERBAGE FOR FEEDING SHEEP AND BLACK CATTLE. For the most satisfactory experiments, made between Michaelmas, 1799, and the first of May, 1800, in order to ascertain which of the following plants can be culti-

vated and housed, or otherwise secured for winter-fodder, to the greatest advantage, viz.

Cole,	Turneps,
Turnep-rooted Cabbage,	Carrots,
Beets,	Parsneps,
Swedish Turneps,	Potatoes;

the GOLD MEDAL.

The ACCOUNTS, with proper CERTIFICATES, to be produced on or before the first Tuesday in November, 1800.

It is required that the above roots be taken off the land by the last day of October, 1799; that a crop of Wheat may be sown on the same ground, and the particulars of the sowing and planting, taking up, produce, preserving, and application to the feeding Sheep and Black Cattle, be specified. The comparative experiments must be made between two or more of any of the above-mentioned plants, and not less than one acre be cultivated with each particular kind of plant.

N. B. Great advantage will arise from the conveniency of keeping large flocks of Sheep, and herds of Cattle, if the difficulty of supporting them through the winter was obviated by a due knowledge of this practice.

It is recommended that experiments be made, and communicated to the Society, on the preservation of Turneps and other roots, in a mode similar to that by which Potatoes are preserved in ridges, tumuli, or hillocks, upon the ground where grown.

96. PARSNEPS. To the person who, in the year 1800, shall cultivate the greatest quantity of land, not less than five acres, with Parsneps, for the sole purpose of feeding Cattle or Sheep; the GOLD MEDAL, or THIRTY GUINEAS.

CER-

CERTIFICATES of the quantity of land so cultivated, with a particular account of the nature and quality of the soil and produce, and also of the condition of the Cattle or Sheep fed with the Parsneps, and the advantages resulting from the practice, to be produced to the Society on or before the second Tuesday in February, 1801.

97. MAKING MEADOW HAY IN WET WEATHER. To the person who shall discover to the Society the best and cheapest method, superior to any hitherto practised, of making Meadow Hay in Wet Weather; the GOLD MEDAL, or THIRTY GUINEAS.

A full account of the method employed, and of the expence attending the process, with not less than fifty-six pounds of the Hay; and Certificates that at least the produce of six acres of land has been made according to the method described, and that the whole is of equal quality with the samples; to be produced on or before the first Tuesday in January, 1801.

98. HARVESTING CORN IN WET WEATHER. To the person who shall discover to the Society the best and cheapest method, superior to any hitherto practised, of harvesting Corn in Wet Weather; the GOLD MEDAL, or THIRTY GUINEAS.

A full account of the method employed, and of the expence attending the process, with not less than two Sheaves of the Corn, and Certificates that at least the produce of four acres has been harvested according to the method described, and that the whole is of equal quality with the samples, to be produced on or before the first Tuesday in January, 1801.

99. CULTIVATING THE TRUE RHUBARB. For having raised, before the end of the year 1800, the greatest number of plants, not less than two thousand, of Rheum Palmatum, or true Rhubarb, the GOLD MEDAL, or THIRTY GUINEAS.

CERTIFICATES of the number of plants, that they stand at least four feet asunder, that they have been in a thriving state during the preceding summer; with an account of the soil, culture, and aspect; to be produced on or before the second Tuesday in February, 1801.

100. ASCERTAINING THE COMPONENT PARTS OF ARABLE LAND. To the person who shall produce to the Society the most satisfactory set of experiments, to ascertain the due proportion of the several component parts of Arable Land, in one or more Counties in Great Britain, by an accurate analysis of it; and who, having made a like analysis of some poor land, shall, by comparing the component parts of each, and thereby ascertaining the deficiencies of the poor soil, improve a quantity of it, not less than one acre, by the addition of such parts as the former experiments shall have discovered to be wanting therein, and therefore probably the cause of its sterility; the GOLD MEDAL, or FORTY GUINEAS.

It is required that the manurings, ploughings, and crops of the improved land, be the same after the improvement as before; and that a minute account of the produce in each state, of the weather, and of the various influencing circumstances, together with the method made use of in analysing the soils, be produced, with proper CERTIFICATES, and the chemical results of the analysis, which are to remain the property of the Society, on or before the last Tuesday in November, 1800.

It

It is expected that a quantity, not less than six pounds, of the rich, of the poor, and of the improved soils, be produced with the Certificates.

101. The same premium is extended one year further.

The ACCOUNTS to be produced on or before the last Tuesday in November, 1801.

102. The same premium is extended one year further.

The ACCOUNTS to be produced on or before the last Tuesday in November, 1802.

103. IMPROVING LAND LYING WASTE. For the most satisfactory account of the best method of improving any of the following soils, being land lying waste or uncultivated, viz. Clay, Gravel, Sand, Chalk, Moor or Peat-earth and Bog; verified by experiments on not less than fifty acres of land; the GOLD MEDAL, or the SILVER MEDAL and TWENTY GUINEAS.

104. For the next greatest quantity of Land, not less than twenty-five acres, the SILVER MEDAL and TEN GUINEAS.

To be produced, with proper CERTIFICATES, on or before the second Tuesday in December, 1800.

The soil, manner of improvement, expence, and produce, together with an account of the uses the improved land has been applied to, are required to be fully explained.

105, 106. The same premiums are extended one year further.

The ACCOUNTS to be produced on or before the second Tuesday in December, 1801.

107,

107, 108. The same premiums are extended one year further.

The ACCOUNTS to be produced on or before the second Tuesday in December, 1802.

N. B. In all claims for this premium, of this or subsequent dates, it will be expected that the Claimants produce some experiments of such a new kind, as the Society have not granted rewards for.

109. MANURES. For the most satisfactory set of experiments, to ascertain the comparative advantages of the following Manures, used as Top-dressings, on Grass or Corn Land, viz. Soot, Coal-ashes, Wood-ashes, Lime, Gypsum, Night-soil, or any other fit article; the GOLD MEDAL, or the SILVER MEDAL and TWENTY GUINEAS.

It is required that the above experiments be made between two or more of the above-mentioned Manures, and that not less than two acres of land be dressed with each Manure. An account of the nature of the soil, quantity and expence of the Manure and Crops, with CERTIFICATES, to be produced on or before the last Tuesday in February, 1801.

110. The same premium is extended one year further.

The ACCOUNTS and CERTIFICATES to be produced on or before the last Tuesday in February, 1802.

111. IMPROVING WASTE MOORS. For the improvement of the greatest number of acres of Waste Moor-Land, not less than one hundred, the GOLD MEDAL.

It

It is required that the land before improvement be absolutely uncultivated, and in a great measure useless; that in its improved state it be inclosed, cultivated, and divided into fields, sufficient for the use and occupation of a tenant.

112. For the next greatest quantity, not les than fifty acres, the SILVER MEDAL, or TWENTY GUINEAS.

113. For the next greatest quantity, not less than twenty-five acres, the SILVER MEDAL, or TEN GUINEAS.

CERTIFICATES of the number of acres, of the quality of the Moor so improved, of the mode and expence of the improvement, the state it is in as to the proportion of grass to arable, and the average value thereof, to be produced on or before the first Tuesday in February, 1801.

114, 115, 116. The same premiums are extended one year further.

CERTIFICATES to be produced on or before the first Tuesday in February, 1802.

117, 118, 119. The same premiums are extended one year further.

CERTIFICATES to be produced on or before the first Tuesday in February, 1803.

120, 121, 122. The same premiums are extended one year further.

CERTIFICATES to be produced on or before the first Tuesday in February, 1804.

123.

123. GAINING LAND FROM THE SEA. To the person who shall produce to the Society an account of the best method, verified by actual experiment, of gaining Land from the Sea, not less than twenty acres, on the coast of Great-Britain, the GOLD MEDAL.

CERTIFICATES of the quantity of Land, and that the experiments were begun after the first of January, 1795, to be produced to the Society on or before the first Tuesday in October, 1800.

124. The same premium is extended one year further.

CERTIFICATES to be produced on or before the first Tuesday in October, 1801.

125. The same premium is extended one year further.

CERTIFICATES to be produced on or before the first Tuesday in October, 1802.

126. The same premium is extended one year further.

CERTIFICATES to be produced on or before the first Tuesday in October, 1803.

127. MACHINE FOR DIBBLING WHEAT. To the person who shall invent the best Machine, to answer the purpose of Dibbling Wheat, by which the holes for receiving the Grain may be made at equal distances and proper depths, the grain regularly delivered therein, and effectually covered; the SILVER MEDAL, or TWENTY GUINEAS.

The MACHINE, with CERTIFICATES that at least three acres have been dibbled by it, to be produced to the Society on or before the second Tuesday in January, 1801.

Simplicity

Simplicity and cheapness in the construction will be considered as principal parts of its merit.

128. MACHINE TO ANSWER THE PURPOSE OF REAPING OR MOWING CORN. For inventing a Machine to answer the purpose of mowing or reaping Wheat, Rye, Barley, Oats, or Beans, by which it may be done more expeditiously and cheaper than by any method now practised, provided it does not shed the corn or pulse more than the methods in common practice, and that it lays the straw in such a manner that it may be easily gathered up for binding; the GOLD MEDAL, or THIRTY GUINEAS.

The MACHINE, with CERTIFICATES that at least three acres have been cut by it, to be produced to the Society on or before the second Tuesday in December, 1800. Simplicity and cheapness in the construction will be considered as principal parts of its merit.

129, DESTROYING THE GRUB OF THE COCK-CHAFER. To the person who shall discover to the Society an effectual method, verified by repeated and satisfactory trials, of destroying the Grub of the Cockchafer, or of preventing or checking the destructive effects which always attend Corn, Peas, Beans, and Turneps, when attacked by those insects; the GOLD MEDAL, or THIRTY GUINEAS.

The ACCOUNTS, with proper CERTIFICATES, to be produced on or before the first Tuesday in January, 1801.

130. DESTROYING THE WIRE-WORM. To the person who shall discover to the Society an effectual method, verified by repeated and satisfactory trials, of destroying

destroying the insect called the Wire-Worm, or of preventing or checking the destructive effects which always attend Corn, Beans, Peas, or Pulse, when attacked by those insects; the GOLD MEDAL, or THIRTY GUINEAS.

The ACCOUNTS, with proper CERTIFICATES, to be produced to the Society on or before the the first Tuesday in January, 1801.

131. DESTROYING THE FLY ON HOPS. To the person who shall discover to the Society an easy and efficacious method of destroying the Fly on Hops, superior to any hitherto known or practised, on not less than six acres of Hop-ground, the GOLD MEDAL, or THIRTY GUINEAS.

ACCOUNTS and CERTIFICATES to be delivered to the Society on or before the first Tuesday in February, 1801.

132. DESTROYING CATERPILLARS ON FRUIT-TREES AND CULINARY PLANTS. To the person who shall discover to the Society an easy and efficacious method of destroying Caterpillars on Fruit-trees, and Culinary Plants, superior to any hitherto known or practised, on an Orchard or Garden of not less than two acres, the GOLD MEDAL, or THIRTY GUINEAS.

ACCOUNTS and CERTIFICATES to be delivered to the Society on or before the first Tuesday in February, 1801.

133. CURE OF THE ROT IN SHEEP. To the person who shall discover to the Society the best and most effectual method of preventing the Rot in Sheep, verified by repeated and satisfactory experiments, the GOLD MEDAL, or FIFTY GUINEAS.

It

It is expected that the Candidates furnish accurate accounts of the nature, symptoms, and cure of the disease, together with the imputed cause thereof, and the actual or probable means of prevention, which, with proper CERTIFICATES, must be delivered to the Society on or before the first Tuesday in February, 1801.

134. PREVENTING AND CURING THE ILL EFFECTS OF THE FLY ON SHEEP. To the person who shall discover to the Society the most effectual method of preventing and curing the ill effects of the Fly on Sheep, the SILVER MEDAL, or TWENTY GUINEAS.

It is required that the method be ascertained by repeated experiments, and that a CERTIFICATE of its efficacy be delivered to the Society on or before the first Tuesday in December, 1800.

135. PROTECTING SHEEP. To the person who, in the year 1800, shall protect the greatest number of Sheep, not fewer than five hundred, in bad seasons, by housing them in hovels or sheds; and give the most satisfactory acount, verified by experiment, of the advantages arising from the practice of defending Sheep from the inclemency of the weather, by such hovels or sheds; the SILVER MEDAL, or TWENTY GUINEAS.

A particular account of the experiments made, with the advantages arising therefrom, together with the expence, and CERTIFICATES of its utility, to be produced to the Society on or before the first Tuesday in March, 1801.

136. The same premium is extended one year further.

The

The ACCOUNTS and CERTIFICATES to be delivered on or before the first Tuesday in March, 1802.

N. B. It is at the option of the Candidates to have their hovels fixed, or moveable; and it is required, that the CERTIFICATES shall specify the length of time the Sheep were under cover, and the manner in which they were maintained during that time; together with the general method of managing them in the said hovels.

137. IMPROVING THE CONDITION OF THE LABOURING POOR, BY ERECTING COTTAGES, AND APPORTIONING LAND. To the person who, in the year 1800, shall erect the greatest number of Cottages for the accommodation of the Labouring Poor, and apportion not less than two acres of Land to each Cottage; the GOLD MEDAL.

The ACCOUNTS and CERTIFICATES to be delivered to the Society on or before the first Tuesday in February, 1801.

138. The same premium is extended one year further.

The ACCOUNTS and CERTIFICATES to be delivered to the Society on or before the first Tuesday in February, 1802.

139. The same premium is extended one year further.

The ACCOUNTS and CERTIFICATES to be delivered to the Society on or before the first Tuesday in February, 1803.

140. IMPROVING THE CONDITION OF THE LABOURING POOR, BY APPORTIONING LAND TO

TO COTTAGES. To the person who, in the year 1800, shall apportion to the greatest number of Cottages already built upon his or her estate, any quantity of Land, not less than two acres to each Cottage, for the better accommodation of the respective inhabitants; the GOLD MEDAL.

The ACCOUNTS of the number of Cottages erected, and of the quantity of Land apportioned to each, to be delivered to the Society, with proper CERTIFICATES, on or before the first Tuesday in February, 1801.

141. The same premium is extended one year further.

The ACCOUNTS and CERTIFICATES to be delivered on or before the first Tuesday in February, 1802.

142. The same premium is extended one year further.

The ACCOUNTS and CERTIFICATES to be delivered on or before the first Tuesday in February, 1803.

Premiums for Discoveries and Improvements in Chemistry, Dying, and Mineralogy.

143. BARILLA. For the greatest quantity of Merchantable Barilla, not less than half a ton, made from Spanish Kali, or any other plant raised in Great Britain; the GOLD MEDAL, or THIRTY GUINEAS.

A sample, of not less than twenty-eight pounds, with a CERTIFICATE that half a ton has been made, to be produced on or before the first Tuesday in January, 1801.

144. PRESERVING SEEDS OF VEGETABLES. For the best method of preserving the Seeds of Plants, in a state fit for vegetation, a longer time than has hitherto been practised, such method being superior to any known to the public, and verified by sufficient trial; to be communicated to the Society on or before the first Tuesday in December, 1800; the GOLD MEDAL, or THIRTY GUINEAS.

145. The same premium is extended one year further; the ACCOUNTS to be produced on or before the first Tuesday in December, 1801.

146. METHOD OF SEPARATING THE SACCHARINE SUBSTANCE OF TREACLE IN A SOLID FORM. To the person who shall discover to the Society the best method of separating the Saccharine Substance of Treacle in a solid form, at such an expence as will

will render it advantageous to the public; the GOLD MEDAL, or FIFTY GUINEAS.

A quantity of the Saccharine Substance, so separated, in a solid form, not less than thirty pounds weight, with an account of the process, and CERTIFICATES that not less than one hundred weight has been prepared, to be produced to the Society on or before the first Tuesday in February, 1801.

147. PRESERVING FRESH-WATER SWEET. To the person who shall produce to the Society the best account, verified by satisfactory trials, of an efficacious method of preserving Fresh-Water sweet during long Voyages; the GOLD MEDAL, or FIFTY GUINEAS.

ACCOUNTS, and full descriptions of the methods made use of, in order that it may be known that nothing injurious enters therein, to be produced to the Society, with at least thirty gallons of Water so preserved, and proper CERTIFICATES, on or before the last Tuesday in December, 1800.

148. The same premium is extended one year further.

The ACCOUNTS and CERTIFICATES to be produced on or before the last Tuesday in December, 1801.

149. PURIFYING BRACKISH OR CORRUPTED WATER. To the person who shall discover to the Society the best and cheapest method, verified by actual experiment, of Purifying or reducing Brackish or Corrupted Water, so as to be fit for the use of families, and for the purpose of cattle; the SILVER MEDAL, or FIFTEEN GUINEAS.

Satisfactory CERTIFICATES that such Brackish Water has been rendered perfectly sweet, and used by some family for domestic purposes, during at least three months, with an account of the method employed in purifying the same, to be delivered to the Society on or before the second Tuesday in February, 1801.

150. DESTROYING SMOKE. For the best account, ascertained by proper experiments, of a cheap method of burning the Smoke of Fires belonging to Steam-Engines, Furnaces employed in calcining or smelting Metals, or other large works, in order to prevent annoyance to the neighbourhood; to be produced on or before the first Tuesday in January, 1801; the GOLD MEDAL, or THIRTY GUINEAS.

151. The same premium is extended one year further.

The ACCOUNTS to be produced on or before the first Tuesday in January, 1802.

152. CONDENSING SMOKE. To the person who shall invent the best method by which the Smoke of Steam-Engines, Brewhouses, Sugar-houses, or Furnaces, may be advantageously condensed and collected in the form of Tar, or some other useful material; the GOLD MEDAL, or FIFTY GUINEAS.

The ACCOUNTS, with proper CERTIFICATES of the method having been successfully employed, and specimens of the materials produced, to be delivered to the Society on or before the first Tuesday in December, 1800.

153. The same premium is extended one year further.

The

The ACCOUNTS and CERTIFICATES to be produced on or before the first Tuesday in December, 1801.

154. CANDLES FROM RESIN OR OTHER SUBSTANCE. To the person who shall discover to the Society the best method of making Candles of Resin, or any other substance, fit for common use, at a price much inferior to those made of Tallow only; the GOLD MEDAL, or THIRTY GUINEAS.

Six pounds at least of the Candles so prepared, with an ACCOUNT of the process, to be delivered to the Society on or before the first Tuesday in December, 1800.

155. REFINING WHALE OR SEAL OIL. For disclosing to the Society an effectual method of purifying Whale or Seal Oil from the glutinous matter that encrusts the wicks of lamps and extinguishes the light, though fully supplied with oil; the GOLD MEDAL, or FIFTY GUINEAS.

It is required that the whole of the process be fully and fairly disclosed, in order that satisfactory experiments may be made by the Society to determine the validity of the claim; and CERTIFICATES that not less than twenty gallons have been purified according to the process delivered in, together with two gallons of the oil, in its unpurified state, and two gallons so refined, be produced to the Society on or before the second Tuesday in February, 1801.

156. The same premium is extended one year further.

CERTIFICATES and SAMPLES to be produced on or before the second Tuesday in February, 1802.

157. CLEARING FEATHERS FROM THEIR ANIMAL OIL. To the person who shall discover to the Society the best and most expeditious method, superior to any hitherto practised, of clearing Goose-feathers from their offensive Animal Oil, for the use of Upholders, in making beds, cushions, &c. the GOLD MEDAL, or FORTY GUINEAS.

A quantity of such Feathers, unstripped, and so cleared, not less than forty pounds weight, with a full account of the process, to be produced to the Society on or before the first Tuesday in February, 1801.

158. SUBSTITUTE FOR, OR PREPARATION OF, YEAST. For discovering to the Society an effectual Substitute for Yeast, or preparation of Yeast, which, after being kept six months, shall be fit for fermenting liquors, and raising bread; the GOLD MEDAL, or THIRTY GUINEAS.

Specimens of the Substitute, or of the Preparation of Yeast, sufficient for trials, together with a paper sealed up, and containing an account of the composition of the Substitute, or method of preparing the Yeast, to be produced on or before the last Tuesday in November, 1800.

159. PROOF SPIRIT. To the Distiller who, in the year 1800, shall make the greatest quantity, not less than one hundred gallons, of a clean marketable Spirit, from articles not the food of man or cattle, equal in strength or quality to the Proof Spirit now in use, and at a rate not higher than the spirit produced from corn or melasses; the GOLD MEDAL, or FIFTY GUINEAS.

Ten

Ten gallons of the Spirit, together with proper CERTIFICATES, and a full account of the expence and mode of making it, to be produced to the Society on or before the first Tuesday in January, 1801.

160. PRESERVING SALTED PROVISIONS FROM BECOMING RANCID OR RUSTY. To the person who shall discover to the Society the best, cheapest, and most efficacious method of preserving Salted Provisions from growing rancid or rusty; the GOLD MEDAL, or THIRTY GUINEAS.

A full description of the method, with proper CERTIFICATES that it has been found, on repeated trials, to answer the purpose intended, to be produced to the Society on or before the first Tuesday in February, 1801.

161. The same premium is extended one year further.

The ACCOUNTS and CERTIFICATES to be produced to the Society on or before the first Tuesday in February, 1802.

162. INCREASING STEAM. To the person who shall invent and discover to the Society a method, verified by actual experiments, of increasing the quantity or the force of Steam, in Steam-Engines, with less fuel than has hitherto been employed, provided that in general the whole amount of the expences, in using Steam-Engines, may be considerably lessened; the GOLD MEDAL, or THIRTY GUINEAS.

To be communicated to the Society on or before the first Tuesday in January, 1801.

163. PREVENTING THE DRY-ROT IN TIMBER. To the person who shall discover to the Society the cause of the Dry-Rot in Timber, and disclose a certain method of prevention, superior to any hitherto known; the GOLD MEDAL, or THIRTY GUINEAS.

The ACCOUNTS of the cause, and method of prevention, confirmed by repeated experiments, to be produced to the Society on or before the second Tuesday in December, 1800.

164. The same premium is extended one year further.

The ACCOUNTS to be produced on or before the second Tuesday in December, 1801.

165. FINE BAR-IRON. To the person, in Great Britain, who shall make the greatest quantity of Bar-Iron, not less than ten tons, with Coak, from Coak Pigs, equal in quality to the best Iron imported from Sweden or Russia, and as fit for converting into Steel; the GOLD MEDAL.

SAMPLES, not less than one hundred weight, with CERTIFICATES that the whole quantity is of equal quality, to be produced to the Society on or before the first Tuesday in January, 1801.

166. METHOD OF PREPARING WHITE LEAD, WHICH SHALL NOT BE PREJUDICIAL. To the person who shall discover to the Society a method of preparing White Lead, in a manner that shall not be prejudicial to the health of the Workmen employed either in making or using it, and will answer all the purposes for which White Lead is at present used; the GOLD MEDAL, or FIFTY GUINEAS.

A quan-

A quantity of the White Lead so prepared, with an account of the process made use of, and CERTIFICATES that not less than one ton has been manufactured in the same manner, to be produced to the Society on or before the second Tuesday in February, 1801.

167. SUBSTITUTE FOR THE BASIS OF PAINT. To the person who shall produce to the Society the best Substitute, superior to any hitherto known, for the Basis of Paint, equally proper for the purpose as the White Lead now employed; such Substitute not to be of a noxious quality, and which may be afforded at a price not materially higher than that of White Lead; the GOLD MEDAL, or ONE HUNDRED GUINEAS.

A quantity of the Substitute, not less than fifty pounds weight, with an ACCOUNT of the process used in preparing it, and CERTIFICATES that at least one hundred weight has been manufactured, to be produced to the Society on or before the second Tuesday in November, 1800.

168. The same premium is extended one year further.

CERTIFICATES and ACCOUNTS to be produced on or before the second Tuesday in November, 1801.

169. RED PIGMENT. To the person who shall discover to the Society a full and satisfactory process for preparing a Red Pigment, fit for use, in oil or water, equal in tone and brilliancy to the best Carmines and Lakes, now known or in use, and perfectly durable; the GOLD MEDAL, or THIRTY GUINEAS.

One

One pound weight of such Colour, and a full disclosure of its preparation, to be produced to the Society on or before the first Tuesday in February, 1801.

N. B. It is not required that the Colour so to be produced should resist the action of fire or chemical applications, but remain unaltered by the common exposure to strong light, damps, and noisome vapours.

170. REFINING BLOCK TIN. To the person who shall discover to the Society the best method of purifying or refining *Block Tin*, in such a manner as to render it fit for the finer purposes to which *Grain Tin* is now solely applied, and at an expence that shall not render it higher in price than *Grain Tin*; the GOLD MEDAL, or FIFTY GUINEAS.

CERTIFICATES that not less than three tons have been refined or purified, with a full detail of the process, and a quantity, not less than one hundred weight, of the Tin so refined, to be produced to the Society on or before the first Tuesday in November, 1800.

171. The same premium is extended one year further.

CERTIFICATES to be produced on or before the first Tuesday in November, 1801.

172. GLAZING EARTHEN WARE WITHOUT LEAD. To the person who shall discover to the Society the cheapest, safest, most durable, and most easily fusible Composition, fit for the purpose of glazing the ordinary kinds of Earthen Ware, without any preparation of Lead, and equal to any hitherto in use; the GOLD MEDAL, or THIRTY GUINEAS.

SPE-

SPECIMENS of the Ware so glazed, with proper CERTIFICATES of its having succeeded, and a SAMPLE of the materials made use of, to be produced to the Society on or before the first Tuesday in February, 1801.

173. PRESERVING IRON FROM RUST. To the person who shall invent and discover to the Society, a cheap Composition, superior to any now in use, which shall effectually preserve Wrought Iron from Rust, the GOLD MEDAL, or FIFTY GUINEAS.

A full description of the method of preparing the Composition, with CERTIFICATES that it has stood at least two years unimpaired, and exposed to the atmosphere during the whole time, to be produced to the Society, with ten pounds weight of the composition, on or before the first Tuesday in January, 1801.

174. The same premium is extended one year further.

The description and CERTIFICATES to be produced to the Society on or before the first Tuesday in January, 1802.

175. The same premium is extended one year further.

The description and CERTIFICATES to be produced to the Society on or before the last Tuesday in January, 1803.

176. OPIUM. To the person who, in the year 1800, shall prepare the greatest quantity, not less than twenty pounds weight, of Opium, from Poppies grown in Great Britain, and equal in quality to the best foreign Opium; the GOLD MEDAL, or FIFTY GUINEAS.

177.

177. For the next greatest quantity, not less than ten pounds weight, the SILVER MEDAL, or TWENTY GUINEAS.

SAMPLES of the Opium, not less than five pounds weight, with proper CERTIFICATES that the whole is of the same quality, to be produced to the Society, with a particular account of the method of cultivating the Poppies, and preparing the Opium, on or before the last Tuesday in February, 1801.

178. SUBSTITUTE FOR TAR. To the person who shall invent and discover to the Society the best Substitute for Vegetable Tar, equal in all its properties to the best Sockholm Tar, and prepared from materials the produce of Great-Britain; the GOLD MEDAL, or ONE HUNDRED GUINEAS.

A quantity of the Substitsute, not less than one hundred weight, with CERTIFICATES that at least one ton has been manufactured, and that it can be afforded at a price not exceeding that of the best foreign Tar, together with an Account of the process, to be delivered to the Society on or before the first Tuesday in March, 1801.

179. The same premium is extended one year further.

The SAMPLES, CERTIFICATES, and ACCOUNTS, to be delivered to the Society on or before the first Tuesday in March, 1802.

Premiums

Premiums for promoting the Polite Arts.

180. HONORARY PREMIUMS FOR DRAWING. For the best Drawing of any kind, made with Water-Colours, Crayons, Chalk, Black Lead, Pen, Indian Ink, or Bister, by young Gentlemen under the age of twenty-one, sons or grandsons of Peers, or Peeresses in their own right, of Great Britain or Ireland, to be produced on or before the first Tuesday in March, 1801, the HONORARY MEDAL of the Society IN GOLD.

131. The same IN SILVER for the next in merit.

182, 183. The same premiums will be given, on the like conditions, to young Ladies, daughters or grand-daughters of Peers, or Peeresses in their own right, of Great Britain or Ireland.

184. HONORARY PREMIUMS FOR DRAWINGS. For the best Drawing of any kind, made with Water-Colours, Crayons, Chalk, Black Lead, Pen, Indian Ink, or Bister, by young Gentlemen under the age of twenty-one; to be produced on or before the first Tuesday in March, 1801; the GOLD MEDAL.

185. For the next in merit, the SILVER MEDAL.

186, 187. The same premiums will be given for Drawings by young Ladies.

N. B. As the foregoing Honorary Premiums are intended only for such of the Nobility and Gentry as may hereafter become patrons or patronesses of the Arts; per-

sons

sons professing any branch of the Polite Arts, or any business dependent on the Arts of Design, or the sons or daughters of such persons, will not be admitted Candidates in these Classes.

The following Premium (Class 188) *is offered in conformity to the Will of the late John Stock, of Hampstead, Esq.*

188. SCULPTURE. For the best Basso-relievo in Terra Cotta, the subject taken from the Iliad of Homer, and consisting of not fewer than three human figures, the height of the principal figure not less than twelve inches, to be produced on or before the third Tuesday in February, 1801, a SILVER MEDALLION, with the following engraved inscription: *The Premium given by the Society for the Encouragement of Arts, Manufactures, and Commerce, in conformity to the Will of John Stock, of Hampstead, Esq.*

The Basso-relievo to which the premium is adjudged, to remain the property of the Society.

189. DRAWINGS OF OUTLINES. For the best Outline, after an original group or cast, in plaster, of Human Figures, by persons of either sex, under the age of sixteen, the principal figure not less than twelve inches; to be produced on or before the third Tuesday in February, 1801; the greater SILVER PALLET.

190. For the next in merit, the lesser SILVER PALLET.

N. B. These Drawings are to be made on Paper; and the original either to be produced to the Society, or to be referred to for their examination.

191. DRAWINGS OF LANDSCAPES. For the best Drawing of a Landscape after nature, by persons of either

either sex, under twenty-one years of age, to be produced on before the third Tuesday in February, 1801, the greater SILVER PALLET.

192. For the next in merit, the lesser SILVER PALLET.

Each Candidate must mention, on the front of the Drawing, from whence the View was taken; and the Drawings must be made with Chalk, Pen, Indian Ink, Water-Colours, or Bister.

193. HISTORICAL DRAWINGS. For the best Historical Drawing, being an original composition, of five or more Human Figures; the height of the principal figure not less than eight inches; to be made with Crayons, Chalk, Black Lead, Pen, Indian Ink, Water-Colours, or Bister, and to be produced on or before the third Tuesday in February, 1801; the GOLD PALLET.

194. For the next in merit, the greater SILVER PALLET.

195. SURVEYS OF COUNTIES. To the person who, in the year 1800, shall complete and publish an accurate Survey of any one County in England or Wales, on a scale of not less than one inch to a mile, for which rewards have not already been given by the Society; the GOLD MEDAL, or FIFTY GUINEAS.

CERTIFICATES of the accuracy of the Survey, and that it was begun after the first of June, 1796, together with the Map, to be produced on or before the first Tuesday in January, 1801.

The Map to which the premium shall be adjudged, to remain the property of the Society.

N. B.

N.B. The Society are already in possession of Surveys of the following Counties, viz. Bedford, Cheshire, Cornwall, Cumberland, Derbyshire, Devonshire, Dorsetshire, Durham, Hampshire, Herefordshire, Hertfordshire, Huntingdonshire, Lancashire, Leicestershire, Northamptonshire, North Wales (large and small), Nottinghamshire, Oxfordshire, Somersetshire, Staffordshire, Suffolk, Surrey, Sussex, Westmoreland, and Worcestershire.

197. The same premium is extended one year further.

The Survey to be begun after the first of June, 1797; and the Map to be produced on or before the last Tuesday in January, 1802.

198. NATURAL HISTORY. To the Author who shall publish, in the year 1800, the Natural History of any County in England or Wales, the GOLD MEDAL, or FIFTY GUINEAS.

It is required that the several natural productions, whether animal, vegetable, or mineral, peculiar to the County, or found therein, be carefully and specifically arranged and described, in order that the Public may be enabled to judge what Arts or Manufactures are most likely to succeed in such County.

The Work to be delivered to the Society on or before the last Tuesday in January, 1801.

199. The same premium is extended one year further.

The Work to be delivered to the Society on or before the last Tuesday in January, 1802.

200.

200. The same premium is extended one year further.

The Work to be delivered to the Society on or before the first Tuesday in January, 1803.

CONDITIONS.

No person who has gained the first Premium in any Class, will be admitted a Candidate in a Class of an inferior age; and no Candidate shall receive more than one Premium in one year; nor will they who for two successive years shall gain the first Premium in one Class, be ever again admitted as Candidates in that Class.

No person shall ever be admitted a Candidate in any Class, in which he has three times obtained the whole of the first Premium.

No Candidate shall send in more than one Performance in any one Class.

All the Claims which are produced each Session before the Committee of Polite Arts (to which Premiums or Bounties are adjudged), are to remain with the Society till after the public distribution of Rewards in May.

No Claim for a Premium in the Polite Arts will be admitted, that has obtained, or has been produced in order to obtain, a Premium, Reward, or Gratification, from any other Society, or any Academy or School.

All Performances that obtain Premiums in the Polite Arts, must be begun after the publication of such Premiums.

Purposely to encourage real merit, and to prevent any attempts to impose on the Society, by producing drawings which shall have been made or retouched by any other person than the Candidate, the Society is resolved, upon all occasions, with respect to the successful Candidates in

Classes 190 to 194 inclusive, to prove their abilities, by requiring a specimen made under the inspection of the Committee of Polite Arts, in every instance where such proof can be obtained.

It is required that all Candidates in the Polite Arts do signify, on their Drawings, their age; and whether the performances are originals, or copies; and, if copies, whence they were taken.

Premiums for encouraging and improving Manufactures.

201. SILK. For the greatest quantity of merchantable Silk, not less than ten pounds weight, produced by Worms bred in England in the year 1800, the property of any one person; the GOLD MEDAL.

202. For the second greatest quantity, not less than five pounds weight, the SILVER MEDAL.

SPECIMENS of the SILK, not less than one pound, with CERTIFICATES that the whole is of equal quality, and produced in England, to be delivered to the Society on or before the first Tuesday in January, 1801.

203. MACHINE FOR CARDING SILK. For the best Machine, superior to any now in use, for carding Waste Silk equally well as by hand; to be produced, together with a specimen of the Cardings, on or before the first Tuesday in November, 1800; the SILVER MEDAL, or TWENTY GUINEAS.

204. CLOTH FROM HOP-STALKS OR BINES. To the person who shall produce to the Society the greatest quantity, not less than thirty yards, of Cloth, at least twenty-seven inches wide, made in Great Britain, of Hop-Stalks or Bines, and much finer in quality than any hitherto manufactured in England of that material; the GOLD MEDAL, or THIRTY GUINEAS.

One pound of the Thread of which the Cloth is made, and thirty yards of the Cloth, together with proper CER-

TIFICATES that the whole is manufactured from Hop-Stalks or Bines, to be produced to the Society on or before the first Tuesday in December, 1800.

N. B. The Society are already in possession of Cloth made in England from Hop-Stalks or Bines, which may be inspected by application to the Register.

205. WICKS FOR CANDLES OR LAMPS. To the person who shall discover to the Society a method of manufacturing Hop-Stalks or Bines, or any other cheap material, the growth of Great Britain, so as to render them fit for the purpose of supplying the place of Cotton, for Wicks of Candles or Lamps; TWENTY GUINEAS.

SAMPLES, not less than five pounds weight, of the Wicks, so prepared, to be produced to the Society, with CERTIFICATES that the whole quantity is equal in quality to the Sample, on or before the second Tuesday in January, 1801.

206. The same premium is extended one year further.

SAMPLES and CERTIFICATES to be produced on or before the second Tuesday in January, 1802.

207. PAPER FROM RAW VEGETABLE SUBSTANCES. To the person in Great Britain who shall make the greatest quantity, not less than ten reams, of the best and most useful Paper, from Raw Vegetable Substances, superior to any hitherto manufactured from such substances; TWENTY GUINEAS.

CERTIFICATES of the making such Paper, and one ream of the Paper, to be produced on or before the first Tuesday in November, 1800.

N. B.

N. B. The Society are in possession of two volumes, containing a great variety of Specimens of Paper made from Raw Vegetables, viz. Thistles, Potatoe-Haum, Poplar, Hop-bines, &c. which volumes may be inspected by any person, on application to the Register.

208. TAKING PORPOISES. To the people in any boat or vessel, who, in the year 1800, shall take the greatest number of Porpoises, on the coast of Great Britain, by Gun-Harpoon, or any other method, not fewer than thirty, for the purpose of extracting oil from them; THIRTY POUNDS.

CERTIFICATES of the number, signed by the persons to whom they have been sold or delivered for the purpose of extracting the oil, to be produced to the Society on or before the last Tuesday in January, 1801.

209. OIL FROM PORPOISES. To the person who shall manufacture the greatest quantity of Oil from Porpoises taken on the coast of Great Britain, in the year 1800, not less than thirty tons; THIRTY POUNDS.

210. For the next greatest quantity, not less than fifteen tons, FIFTEEN POUNDS.

CERTIFICATES of the Oil having been made from Porpoises actually caught on the coast of Great Britain, and two gallons of the Oil, as a Sample, to be produced to the Society on or before the last Tuesday in February, 1801.

Premiums for Inventions in Mechanicks.

211. TRANSIT INSTRUMENT. To the person who shall invent and produce to the Society a cheap and portable Transit Instrument, which may easily be converted into a Zenith Sector, capable of being accurately and expeditiously adjusted for the purpose of finding the Latitudes and Longitudes of places, and superior to any portable Transit Instrument now in use; the GOLD MEDAL, or FORTY GUINEAS.

To be produced on or before the last Tuesday in Jannary, 1801.

212. TAKING WHALES BY THE GUN-HARPOON. To the person who, in the year 1800, shall strike the greatest number of Whales, not fewer than three, with the Gun-Harpoon; TEN GUINEAS.

Proper CERTIFICATES of the striking such Whales, and that they were actually taken in the year 1800, signed by the Master, or by the Mate when the Claim is made by the Master, to be produced to the Society on or before the last Tuesday in December, 1800.

213. DRIVING BOLTS INTO SHIPS. To the person who shall invent and produce to the Society a Model, shewing a method of driving Bolts into Ships, particularly those of Copper, without splitting the head or bending them, with more dispatch, in all directions, and tighter than by any means hitherto known or in use; the GOLD MEDAL, or FORTY GUINEAS.

The

The Model, with CERTIFICATES that a Machine on the same construction has been used to advantage, to be produced to the Society on or before the first Tuesday in February, 1801.

214. PARISH OR FAMILY MILL. To the person who shall invent and produce to the Society, the best constructed Mill for grinding Corn for the use of private families, or parish poor; the construction to be such as to render the working of the Mill easy and expeditious, and superior to any hitherto in use; the GOLD MEDAL, or FORTY GUINEAS.

The Mill, and CERTIFICATES of its having been used to good effect, to be produced to the Society on or before the first Tuesday in February, 1801.

N. B. Cheapness and simplicity will be considered as essential parts of its merit; and the Mill, or the Model, to remain with the Society.

215. MACHINE FOR RAISING COALS, ORE, &c. &c. To the person who shall invent a Machine for raising Coals, Ore, &c. from Mines, superior to any hitherto known or in use, and which shall produce the effect at a less expence than those already known or in use; the GOLD MEDAL, or FIFTY GUINEAS.

A Model of the Machine, made on a scale of not less than one inch to a foot, with a CERTIFICATE that a Machine at large on the same construction has been advantageously used, to be produced to the Society on or before the second Tuesday in February, 1801.

216. MACHINE FOR RAISING WATER. To the person who shall invent a Machine, on a better,

cheaper, and more simple construction than any hitherto known or in use, for raising Water out of Wells, &c. from a depth not less than fifty feet; the GOLD MEDAL, or FORTY GUINEAS.

CERTIFICATES of the performance of the Machine, and a Model of it, on a scale of not less than one inch to a foot, to be produced to the Society on or before the first Tuesday in February, 1801.

217. MACHINE FOR MAKING BRICKS. To the person who shall invent the best and cheapest Machine for making Bricks, superior to any hitherto known or in use, whereby the labour and expence of making Bricks in the usual mode, by hand, may be greatly diminished; FORTY GUINEAS.

A Model, with CERTIFICATES that a Machine at large, on the same construction. has been used to good effect for the purpose of making Bricks, and that at least one hundred thousand Statute Bricks have been made therewith, to be produced to the Society on or before the first Tuesday in March, 1801.

218. BORING ROCKS IN ORDER TO BLAST THEM. To the person who shall discover to the Society a more cheap, simple, and expeditious Method than any hitherto known or in use, of Boring Rocks in Mines, Shafts, Wells, &c. for the purpose of Blasting them with Gunpowder; the GOLD MEDAL, or FORTY GUINEAS.

CERTIFICATES of the Method having been practised with success, with a full description thereof, to be delivered to the Society on before the first Tuesday in January, 1801.

*218. CLEANSING CHIMNEYS. To the person who shall invent and produce to the Society the most simple, cheap, and proper apparatus, superior to any hitherto known or in use, for cleansing Chimneys from Soot, and obviating the necessity of children being employed within the flues, in the manner now practised; the GOLD MEDAL, or FORTY GUINEAS.

The Apparatus, with CERTIFICATES of its having been used with proper effect, to be produced to the Society on or before the third Tuesday in February, 1800.

219. PREVENTING PASSENGERS IN CARRIAGES BEING INJURED WHEN THE HORSES HAVE TAKEN FRIGHT. To the person who shall invent and discover to the Society the best and most effectual method of preventing Passengers in Carriages being injured when the Horses have taken fright; the GOLD MEDAL, or THIRTY GUINEAS.

CERTIFICATES that the Invention has been usefully applied to at least one Carriage, and may be advantageously applied to others, to be produced to the Society on or before the second Tuesday in February, 1801.

220. GUNPOWDER MILLS. To the person who, in the year 1800, shall invent and bring to perfection the most effectual method of so conducting the works of Gunpowder Mills, in the business of making Gunpowder, as to prevent explosion; the GOLD MEDAL, or ONE HUNDRED GUINEAS.

CERTIFICATES and ACCOUNTS of the method having been put in practice in one or more Gunpowder Mills in this

this kingdom, and that it promises, in the opinion of the best judges concerned in such works, to answer the purpose intended, to be produced to the Society on or before the first Tuesday in February, 1801.

221. The same premium is extended one year further.

The ACCOUNTS and CERTIFICATES to be produced on or before the first Tuesday in February, 1802.

N. B. As an encouragement to persons to turn their thoughts to improvements of this nature, if any should be made on the present method of conducting the business of Gunpowder-making, which fall short of the total prevention of explosion, and they are sent to the Society, for the sake of humanity, the Papers so sent in will receive due consideration, and such Bounty or Reward will be bestowed thereon as they appear to merit.

222. MILL STONES. To the person who shall discover, in Great Britain, a Quarry of Stone fit for the purposes of Mill Stones, for grinding Wheat, and equal in all respects to that Stone known by the name of FRENCH BURR; the GOLD MEDAL, or ONE HUNDRED POUNDS.

A pair of Mill Stones, at least three feet eight inches diameter, with an account of the situation of the Quarry, and CERTIFICATES that not fewer than two pair of such Mill Stones have been effectually used for grinding Wheat, to be produced to the Society on or before the first Tuesday in February, 1801.

223. The same premium is extended one year further.

The ACCOUNTS, SAMPLES, and CERTIFICATES to be produced to the Society on or before the first Tuesday in February, 1802.

224.

224. HEATING ROOMS FOR THE PURPOSES OF MANUFACTURERS. To the person who shall invent and discover to the Society a Method of Heating Rooms, superior to any hitherto known or in use, and at a moderate expence, for the purposes of Painters, Japanners, and other Manufacturers, so as to avoid the necessity of iron or copper tunnels going through the rooms to convey the smoke, whereby the danger from such tunnels may be prevented; the GOLD MEDAL, or FORTY GUINEAS.

A Model, or complete Drawing and Description of the Method, with CERTIFICATES that is has been successfully practised, to be delivered to the Society on or before the last Tuesday in March, 1801.

Premiums

Premiums offered for the advantage of the British Colonies.

225. NUTMEGS, For the greates quantity of merchantable Nutmegs, not less than ten pounds weight, being the growth of his Majesty's dominions in the West Indies, or any of the British Settlements on the Coast of Africa, or the several Islands adjacent thereto, and equal to those imported from the Islands of the East Indies; the GOLD MEDAL, or ONE HUNDRED GUINEAS.

Satisfactory CERTIFICATES, from the Governor or Commander in Chief, of the place of growth, with an account of the number of trees, their age, nearly the quantity of fruit on each tree, and the manner of culture, to be produced on or before the first Tuesday in December, 1800.

226. The same premium is extended one year further.

CERTIFICATES to be produced on or before the second Tuesday in December, 1801.

227. CINNAMON. For importing into the port of London, in the year 1800, the greatest quantity, not less than twenty pounds weight, of Cinnamon, being the growth of some of the Islands in the West Indies belonging to the Crown of Great Britain, or any of the British Settlements on the Coast of Africa, or the several Islands adjacent thereto, and equal in goodness to the Cinnamon brought from the East Indies; the GOLD MEDAL, or FIFTY GUINEAS.

SAMPLES, not less than two pounds weight, with CERTIFICATES that the whole quantity is equal in goodness;

ness; together with satisfactory CERTIFICATES, signed by the Governor, or Commander in Chief, of the place of growth, with an account of the number of trees growing on the spot, their age, and the manner of culture; to be produced to the Society on or before the first Tuesday in January, 1801.

228. CLOVES. For importing into the port of London, in the year 1800, the greatest quantity of Cloves, not less than twenty pounds weight, being of the growth of some of the Islands of the West Indiess subject to the Crown of Great Britain, or any of the British Settlements on the Coast of Africa, or the several Islands adjacent thereto, and equal in goodness to the Cloves brought from the East Indies; the GOLD MEDAL, or FIFTY GUINEAS.

SAMPLES, not less than two pounds weight, with CERTIFICATES that the whole quantity is equal in goodness, together with satisfactory CERTIFICATES, signed by the Governor, or Commander in Chief, of the place of growth, with an account of the number of trees growing on the spot, their age, and the manner of culture, to be produced to the Society on or before the first Tuesday in January, 1801.

229. The same premium is extended one year further.

SAMPLES and CERTIFICATES to be produced on or before the first Tuesday in January, 1802.

230. PLANTATIONS OF BREAD-FRUIT TREES. To the person who shall have raised in any of the Islands of the West Indies, subject to the Crown of Great Britain, or in any of the British Settlements on the Coast of Africa,

Africa, or the several Islands adjacent thereto, between the first of January, 1799, and the first of January, 1800, the greatest number of Bread-fruit Trees, not fewer than one hundred, and properly fenced and secured the same, in order to supply the Fruit to the Inhabitants; the GOLD MEDAL, or THIRTY GUINEAS.

Proper ACCOUNTS and CERTIFICATES, signed by the Governor, or Commander in Chief, of the methods made use of in cultivating the Plants and securing the Plantation, and that the Trees are in a growing and thriving state at the time of signing such Certificates, to be produced to the Society, with Samples of the Fruit, on or before the first Tuesday in January, 1801.

231. The same premium is extended one year further.

The ACCOUNTS and CERTIFICATES to be produced on or before the first Tuesday in January, 1802.

232. The same premium is extended one year further.

The ACCOUNTS and CERTIFICATES to be produced on or before the first Tuesday in January, 1803.

233. KALI FOR BARILLA. To the person who shall have cultivated, in the Bahama Islands, or any other part of his Majesty's dominions in the West Indies, or any of the British Settlements on the Coast of Africa, or the several Islands adjacent thereto, in the year 1797, the greatest quantity of land, not less than two acres, with Spanish Kali, fit for the purpose of making Barilla; the GOLD MEDAL, or THIRTY GUINEAS.

234. For the next greatest quantity, not less than one acre, the SILVER MEDAL, or FIFTEEN GUINEAS.

CER-

CERTIFICATES, signed by the Governor, or Commander in Chief for the time being, of the quantity of land so cultivated, and of the state of the Plants at the time of signing such Certificates, to be delivered to the Society, with Samples of the Kali, on or before the second Tuesday in November, 1800.

235, 236. The same premiums are extended one year further.

CERTIFICATES to be produced on or before the second Tuesday in November, 1801.

237, 238. The same premiums are extended one year further.

CERTIFICATES to be produced on or before the second Tuesday in November, 1802

239. DESTROYING THE INSECT COMMONLY CALLED THE BORER. To the person who shall discover to the Society an effectual method of destroying the Insect commonly called the BORER, which has of late years been so destructive to the Sugar-Canes in the West-India Islands, the British Settlements on the Coast of Africa, and the several Islands adjacent thereto; the GOLD MEDAL, or FIFTY GUINEAS.

The Discovery to be ascertained by satisfactory CERTIFICATES, under the hand and seal of the Governor, or Commander in Chief for the time being, and of some other respectable persons, inhabitants of the Islands, or other place, in which the remedy has been successfully applied; such CERTIFICATES to be delivered to the Society on or before the first Tuesday in January, 1801.

240. The same premium is extended one year further.

CERTIFICATES to be delivered on or before the first Tuesday in January, 1802.

241. BOTANIC GARDEN IN THE BAHAMA ISLANDS. To the person who, before the first of January, 1800, shall have set apart, and, at his own private expence, shall have properly fenced and cultivated, the greatest quantity of ground, not less than five acres, in any of the Bahama Islands, as a Botanic Garden, for the purpose of making experiments in the culture of those articles which are the peculiar production of the tropical climates, and which may tend to promote the commerce and manufactures of this country; the GOLD MEDAL, or ONE HUNDRED GUINEAS.

It is required that any person claiming the foregoing premium should produce to the Society, on or before the first Tuesday in January, 1801, a CERTIFICATE from the Governor, or Commander in Chief of the Bahama Islands for the time being, of his having complied with the above requisitions, and that the Garden is in a proper state of culture at the time of signing such Certificate.

Premiums offered for the advantage of the British Settlements in the East Indies.

242. BHAUGULPORE COTTON. To the person who shall import into the port of London, in the year 1800, the greatest quantity, not less than one ton, of the Bhaugulpore Cotton, from which clothes are made in imitation of Nankeen, without dying; the GOLD MEDAL.

A quantity of the Cotton, not less than five pounds weight in the pod, and five pounds carded, to be produced to the Society, with proper CERTIFICATES, signed by the Secretary to the Board of Trade of Bengal or Bombay, on or before the last Tuesday in February, 1801.

243. The same premium is extended one year further.

The SAMPLES and CERTIFICATES to be produced to the Society on or before the last Tuesday in February, 1802.

244. The same premium is extended one year further.

The SAMPLES and CERTIFICATES to be produced to the Society or or before the last Tuesday in February, 1803.

245. ANNATTO. To the person who, in the year 1800, shall import into the port of London, from any part of the British Settlements in the East Indies, the greatest quantity of Annatto, not less than five hundred weight; the GOLD MEDAL.

A quantity of the Annatto, not less than ten pounds weight, to be produced to the Society, with proper CERTIFICATES, signed by the Secretary of the Board of Trade of the respective Settlement, that the Annatto is the produce of such Settlement, on or before the last Tuesday in February, 1801.

246. The same premium is extended one year further.

The SAMPLES and CERTIFICATES to be produced to the Society on or before the last Tuesday in February, 1802.

247. The same premium is extended one year further.

The SAMPLES and CERTIFICATES to be produced to the Society on or before the last Tuesday in February, 1803.

248. TRUE COCHINEAL. To the person who, in the year 1800, shall import into the port of London, from any part of the British Settlements in the East Indies, the greatest quantity of True Cochineal, not less than five hundred weight; the GOLD MEDAL.

A quantity of the Cochineal, not less than ten pounds weight, with proper CERTIFICATES, signed by the Secretary of the Board of Trade of the respective Settlement, that the Cochineal is the produce of such Settlement, to be produced to the Society on or before the first Tuesday in February, 1801.

249. The same premium is extended one year further.

The SAMPLES and CERTIFICATES to be produced on or before the first Tuesday in February, 1802.

Society's

Society's Office, Adelphi, *June* 1, 1800.

Ordered,

That the several Candidates and Claimants to whom the Society shall adjudge Premiums or Bounties, do attend at the Society's Office in the Adelphi, on the last Tuesday in May, 1801, at Twelve o'Clock at Noon, to receive the same; that Day being appointed by the Society for the Distribution of their Rewards: And before that Time no Premium or Bounty will be delivered, excepting to those who are about to leave the Kingdom, or prevented by unavoidable Accidents.

In Cases where the Society may think fit to admit Excuses for not attending in Person, Deputies may be substituted to receive the Rewards, provided such Deputies are either Members of the Society, or the superior Officers thereof.

GENERAL CONDITIONS.

NOTWITHSTANDING the Society reserve to themselves the power of giving, in all cases, such part only of any Premium as the performance shall be adjudged to deserve, or of withholding the whole, if there be no merit; yet the Candidates may be assured the Society will always judge liberally of their several Claims.

It is required that the matters for which Premiums are offered, be delivered in without names, or any intimation to whom they belong; that each particular thing be marked in what manner each Claimant thinks fit, such Claimant sending with it a paper sealed up, having on the outside a corresponding mark, and on the inside the Claimant's name and address: and all Candidates are to take notice, that no Claim for a Premium will be attended to, unless the conditions of the Advertisement are fully complied with.

No Papers shall be opened, but such as shall gain Premiums, unless where it appears to the Society absolutely necessary for the determination of the Claim; all the rest shall be returned unopened, with the Matters to which they belong, if enquired after by the Mark, within two years; after which time, if not demanded, they shall be publicly burnt, unopened, at some meeting of the Society.

All Models of Machines, which obtain Premiums or Bounties, shall be the property of the Society; and where a Premium or Bounty is given for any Machine, a perfect Model thereof shall be given to the Society.

All the Premiums of this Society are designed for Great Britain, unless expressly mentioned to the contrary.

The

The Claims shall be determined as soon as possible after the delivery of the specimens.

No person shall receive any Premium, Bounty, or Encouragement from the Society, for any matter for which he has obtained, or purposes to obtain, a patent.

A Candidate for a Premium, or a person applying for a Bounty, being detected in any disingenuous method to impose on the Society, shall forfeit such Bounty, and be deemed incapable of obtaining any for the future.

The Performances which each year obtain Premiums or Bounties are to remain with the Society until after the public distribution of Rewards.

No member of this Society shall be a Candidate for, or entitled to receive, any Premium, Bounty, or Reward whatsoever, except the Honorary Medal of the Society.

Where Certificates are required to be produced in claim of Premiums, they should be expressed, as nearly as possible, in the words of the respective advertisements, and should not be from the Candidate (solely), but from some other person or persons who have a positive knowledge of the facts certified.

Where Premiums or Bounties are obtained in consequence of specimens produced, the Society mean to retain such part of those specimens as they may judge necessary, making a reasonable allowance for the same.

No Candidates shall be present at any meetings of the Society or Committees, or admitted at the Society's Rooms, after they have delivered in their Claims, until such Claims are adjudged, unless summoned by the Committee.

N. B. Any information or advice that may forward the designs of this Society for the public good, will be received thankfully, and duly considered, if communicated

by letter, addressed to the Society, and directed to Mr. CHARLES TAYLOR, the Secretary, at the Society's Office, in the Adelphi Buildings, London.

As the Acres of different Districts vary in extent, it is necessary to observe, that the Society mean Statute Acres, of five and a half yards to the rod or pole, when acres are mentioned in their list of premiums; and they request that all communications to them may be made agreeably thereto. The Society also desire that the Papers on different subjects sent in to them may be full, clear, explicit, and fit for publication.

*** In case any person should be inclined to leave a sum of money to this Society, by will, the following form is offered for that purpose:

Item. I give and bequeath to A. B. and C. D. the sum of upon condition and the intent that they, or one of them, do pay the same to the Collector for the time being of a Society in London, who now call themselves the Society for the Encouragement of Arts, Manufactures and Commerce; which said sum of I will and desire may be paid out of my personal estate, and applied towards the carrying on the laudable designs of the Society.

By Order of the Society,

CHARLES TAYLOR, Secretary.

PAPERS

IN

AGRICULTURE.

AGRICULTURE.

THE GOLD MEDAL, being the Premium offered for planting ACORNS, was this Session adjudged to the Right Honourable the MARQUIS of TITCHFIELD, of Grosvenor-Street, from whom the following Account and Certificate were received.

SIR,

THIS is to certify, That between October 1798, and April 1799, the following pieces of Land were sown with Acorns, viz.

One piece of land, in quantity thirty-four acres, was sown with one thousand and eighty-eight bushels of Acorns, in drills of about twenty-four inches apart; the land was previously prepared by a turnip-fallow, and at the same time that the

the Acorns were sown, it was sown with rye broad-cast, which produced a good crop, and the Oak-plants have a thriving and healthy appearance.

The soil is light sand, with a very small mixture of gravel; part of it had been sown with turnips in 1797; and the remainder, which had been too much cropped, was worn-out grass, very full of weeds. The whole was fallowed in the autumn of that year, and in the summer following was repeatedly ploughed and harrowed; and, in short, put into perfect order for turnips, which were manured with malt combs, at the rate of ten quarters per acre, except where turnips had been sown the year before, and which therefore received a smaller dressing of malt combs. The turnips were hoed only once; they were a tolerable crop, and were begun to be eaten off by sheep in the month of November. As fast as the turnips were eaten, the land was ploughed and harrowed, and rye was

ploughed

ploughed in by a second ploughing. The Acorns were sown at the rate of thirty-two bushels per acre, in every third furrow, and covered by the fourth, and they stood in rows from eighteen to twenty-four inches asunder: the rye did not require weeding; and when reaped, was carried by hand to vacant places, from whence it was carted. The rye stubble is supposed to have been a great protection to the young plants, which have not suffered either by frost or drought.

Another piece of land, in quantity eleven acres, was sown with three hundred and eighty-four bushels of Acorns, broad-cast; the land was previously prepared by ploughing only, and at the same time it was sown with rye, which did not produce a good crop. The Oak-plants have a very healthy appearance. This plantation is situated upon a part of Sherwood Forest lately inclosed, the soil of which is light and gravelly, and has

lately

lately been cleared of old Oaks. It was ploughed only once, and sown at the end of October with rye and acorns, at the rate of twenty-four bushels per acre, in the same manner as that before described; but from want of tillage it was left in a very rough state, and the rye was so bad a crop as not to be worth reaping. The Acorns, however, grew as well as could be desired; this year they appear to have suffered from the grub.

A third piece of land, in quantity four acres and a half, was sown with two hundred and eight bushels of Acorns, some in beds of forty-eight inches wide, and furrows in each bed, and some in drills of nine inches and a half apart; the land was previously prepared by trenching. Those sown in beds grow very well, those in drills extremely ill.

This plantation is on a clay soil, with strong patches of gravel: the land was trenched in the years 1797 and 1798 from old

old grass, and was the greatest part sown with acorns at the rate of forty-eight bushels per acre, in beds, which grew perfectly well. Upon a small part of the land, which had been sown as it had been trenched, without being thrown up into beds, the plants do not thrive The sowing of this plantation was begun in October 1798, and was not finished till March 1799.

It was necessary, during the winter and spring succeeding the sowing of the Acorns, to employ persons to frighten away the crows, which otherwise would have thinned the crop very much.

I am, Sir,

Your humble Servant,

Robert Mee.

This

THIS is to certify, That the pieces of land sown with Acorns, named in the annexed Paper, were,

First, One piece, upwards of thirty-four acres, situated in the parish of Norton Cuckney, in the county of Nottingham.

Secondly, One piece, upwards of eleven acres, situated in the parish of Sutton in Ashfield, vulgarly called Thieves Wood, in the same county.

Thirdly, A piece of land, in the liberty of Welbeck, upwards of four acres and a half, and in the same county.

The whole were sown by the directions of the Marquis of Titchfield.

ROBERT MEE, Woodman.

THIS is to certify also, That the several Plantations above-mentioned are properly fenced and secured against cattle.

ROBERT MEE, Woodman.
SCOTT TITCHFIELD.

Nov. 1, 1799.

SIR,

YOUR letter of the 31st of January, I last night received; in answer to which I have to assure you, that I did sign a Certificate in November last, by which is shown, that the Marquis of Titchfield had sown forty-nine and a half acres of land between October 1798, and April 1799. In answer to your next question, whether there were at least three hundred young Oaks growing on each acre, I have to inform you, that there is not a single acre, in any of the plantations, but what has many thousands of young Oak-plants growing upon it.

I further beg leave to state to you, as below, how many are counted and growing on two square yards, in each plantation, the situation averaged as near as possible.

In Lord Woodstock's plantation, in Norton, there are, on two square yards, 306 Oak-plants; which, multiplied by

4840 (the square yards in an acre), the product will be 1,481,040, growing on two acres.

In Thieves Wood plantation, at Sutton in Ashfield, there are, on two square yards, 143 Oak-plants; which, multiplied as above, the product will be 692,120, growing on two acres.

In Pope's plantation, in Welbeck, there are, on two square yards, 428 Oak-plants; which, multiplied as before, will be 2,071,520, growing on two acres.

I am, SIR,

Your most obedient Servant,

ROBERT MEE.

Norton,
Feb. 10, 1800.

MR. TAYLOR.

The

The GOLD MEDAL, being the Premium offered for planting LARCH-TREES, was this Session adjudged to THOMAS JOHNES, M. P. of Hafod, from whom the following Papers were received.

Account of Larch-Trees planted by Thomas Johnes, Esq. of Hafod, in Cardiganshire.

FROM June 1796, to June 1797, four hundred thousand Larches were planted, of which 300,000 were two-years-old seedlings, 35,000 which had been transplanted one year, and 15,000 which had been three years transplanted.

The two-years-old seedling Larches were planted at two feet asunder; those which had been one year transplanted, were planted at two feet and a half, and the others at three to three feet and a half asunder.

I look upon the two-years-old seedling Larches as preferable to any other sizes

for planting high grounds, as the winds make little or no impression upon their tops before their roots get properly fixed in the ground.

The above plantation-grounds were all properly inclosed before any of the trees were planted.

The greatest part of the plantations is fenced with a stone wall, five feet high; the remainder with a turf-fence, the same height, with a dead hedge, and willows planted on the top.

The above plantations are doing extremely well, and the young trees have made good shoots during the last summer.

James Todd, Gardener.

THIS is to certify, That Thomas Johnes, Esq. has planted, on his estate at Hafod, in the county of Cardigan, the above number of trees as already specified; and that I have walked over the plantations with the gardener, and found

found the same in a thriving state, very few of the plants having failed. The plantations are effectually fenced and secured to grow timber; as witness my hand, this 27th day of November, 1799.

LEWIS EVANS,
Minister of Eglwys Newydd.

MR. TAYLOR.

The GOLD MEDAL, being the Premium offered for planting TIMBER-TREES, was this Session adjudged to the Reverend WILLIAM SMITH, A. M. of Craike, near Easingwold, in the county of York, from whom the following Account and Certificate were received.

SIR,

HAVING, in the years 1796 and 1797, made a plantation of different kinds of Forest-Trees, upon a piece of moor-land, in the township of Flaxton, in the North Riding of the county of York, and which contains eleven acres, I am induced to present to the Society for the Encouragement of Arts, &c. a statement of it, together with the expence, and such remarks as have appeared to me to deserve attention.

Should

Should the Society consider the inclosed as entitled to their Honorary Premium, I shall be highly flattered by such a mark of their approbation.

I remain,

SIR,

Your obedient Servant,

PHILO-DENDRON.

A Statement of the number of Trees planted, and Expence in a Plantation made upon Flaxton-Moor, in the years 1796 *and* 1797, *containing eleven acres.*

Names of Trees.	*No. planted Jan.* 1796.	*No. planted Feb.* 1797.	*Total Number.*	*Height when planted.*	*Cost of the Trees.* £.	s.	d.	*Remarks.*
Larch	3000	800	3800	2 feet	9	0	0	Grow well, having made shoots 2 feet this year
Scotch Tar	1000	200	1200	18 in.	1	17	0	Very healthy, and make strong shoots
Birch	1000	200	1200	2 feet	0	14	0	Grow well
Oak	215	1400	1615	2 feet	2	6	0	Healthy, but not luxuriant
Beech	300		300	2½ feet	1	6	0	Grow extremely well
Spruce Fir	200		200	2 feet	0	10	0	Do not appear to answer
Ash	200		200	2 feet	0	5	0	Thrive tolerably
Wych Elm	100	100	200	2 feet	0	16	0	Grow very well
Poplar	200		200	1 foot	0	2	0	Tolerably
Horse Chesnut	100		100	18 in.	0	6	0	Answer very well
Sycamore	200		200	2 feet	0	12	0	Alive, but make no great progress
Common Maple	100		100	2 feet	0	6	0	Only tolerably
Lime	50		50	2 feet	0	3	9	Tolerably
Platinus	50		50	2 feet	0	10	0	Land too cold, but alive
Spanish Chesnut	50		50	2½ feet	0	4	0	Ditto
Alder		100	100	2 feet	0	2	0	Answer very well
Weeping Birch		50	50	2 feet	0	3	6	Ditto
Crabs		50	50	2 feet	0	2	6	Ditto
	6765	2900	9665		19	5	9	
Quickwood - - - -					1	16	0	
Ditching 97 rood, at 10d. per rood -					4	0	10	
9665 trees planting, at 1s. 6d. per 100					7	5	0	
Hedge cutting, rails, winding with thorns, and other small expences					1	16	0	
224 oak-posts, at 6d. each - -					5	12	0	
370 rails, at 3½d. each - - -					5	7	11	
Total expence - - £.					45	3	6	

WE, the Minister, Chapel-Warden, and principal inhabitants of Flaxton, in the North Riding of the county of York, do certify, that we believe the annexed statement to be a true one, and that the trees mentioned therein are in a thriving and healthy state, and that the fences are in good order, and well secured by posts and rails.

As witness our hands, this 21st day of October, 1799.

ANTHONY GERMAIN, Minister.
WM. FAWCETT, Chapel-Warden.
W. LUND,
T. WRIGHT,
R. TENNANT,
H. MIDGLAY,
W. BURTON,
} Principal inhabitants.

WE, Robert Midglay and William Dawson, being the persons employed to plant the trees, set the quickwood, and do every other necessary business at the above-mentioned plantation, do hereby certify, that we did plant the number specified in the statement, during the beginning of the years 1796 and 1797, and that we have every year since been employed to keep the fences in proper order, and have planted several trees, to make up the deficiency of the few that have died.

As witness our hands, this 30th day of October, 1799.

ROBERT MIDGLAY,
WILLIAM DAWSON.

Obser-

Observations on the preceding Statement.

THE ground on which this plantation is made, is part of an allotment of sixty acres, which was granted, during the protectorate of Cromwell, to the then possessor, as his right on the common of Flaxton. After this event took place, the land was divided into fields of from eight to ten acres each, and several oaks set in the fences, most of which, of tolerable dimensions, have within these few years been cut down, and some yet remain; but the fences are nearly all gone to decay from neglect, and other causes unknown to the present owner. In the year 1792, a small piece of land was taken up, not much exceeding an acre, and planted with 1200 different kinds of forest-trees, the expence of which, with the fencing, amounted to 9l. 1s. 8d. This small experiment appearing to answer every expectation,

pectation, I was induced to make the plantation, as mentioned in the statement, on part of the above moor, the soil of which is a black sand, with a clay underneath, and not of more value to rent in its present state than 2s. 6d. per acre. The situation being low and wet, the whole, excepting two lands at the extremities, was, in the summer of 1795, ploughed, leaving the furrows open, that the roots of the trees might be kept as dry in the winter as the fall would admit.

The reason why the greatest number of oaks were planted the second year, was from an idea that the shelter afforded by the firs having obtained a year's growth, would greatly promote the growth of the oaks; and, in this supposition I have not been deceived, as in the plantation made in 1792, and which was last year joined to this, by another piece of land of about three acres then taken in. The oaks were there set

at

at the same time as the firs, but on one part were not mixed with them; and in that part they thrived so ill, as to make no progress, until some Scotch firs were planted among them; since which they have assumed a different appearance, and are now growing tolerably well. Another advantage, I have observed in planting, arises from having the holes made the year before the plants are put in: by this method the frost meliorates the sod, and makes it, particularly in bad land, finer, which encourages the fibres of the young plants to shoot more freely.

I have remarked that two lands in this plantation were not ploughed; and the reason that induced me to mention the circumstance, was the supposition that the trees would grow best upon the land that was ploughed. In this I have not been disappointed; those that were set upon the two lands not ploughed, having made less shoots than the other; and though they grow tolerably well, yet an evident,

evident difference is observable in the luxuriancy of their appearance, which certainly is an additional proof that ploughing the land, and making the holes the year preceding the planting of trees, is of material consequence in the success of an undertaking of this nature. In this statement notice has been taken of the plants that flourish best. The larch undoubtedly take the lead, a great number of them having this summer made shoots two feet in length. The Scotch firs are the next; the rest do very well, excepting the platinus, Spanish chesnut, and spruce fir. The land is certainly not sufficiently rich for the two former, and they were only planted to make a variety; but why the spruce fir does not prosper so well, being a hardy tree, can only arise from its dislike, probably, to a clayey soil, and its being too wet. The quickwood for the land grows remarkably well, which is in a great measure owing to its being well fenced with posts and rails, the latter wound with

thorns,

thorns, and to its being regularly well dressed, dug, and cleaned, at least once a year. The trees planted the second year were not set to make up the deficiency of those which might fail the former season, the whole of the ground having, the two first years, been carefully looked over; and when any tree has been found dead, in general another has been substituted so as to preserve the usual number.

Should the above short remarks tend to benefit persons making plantations, it will be a great satisfaction to me; and I can only add, that if there is nothing new in the observations, at least there is nothing false; and I hope that the certificates which I have annexed, will be sufficiently satisfactory to a Society for which I entertain the highest esteem.

I remain, SIR,

Your very obedient servant,

Nov. 1, 1799. WILLIAM SMITH.

MR. TAYLOR.

SIR,

I WAS honoured with your favour of the 2d instant; and in answer thereto, request you will inform the Society that the whole of the trees are planted in holes at about the distance of seven feet plant from plant; that the different species were intermixed, some attention being paid to plant them upon the soil which was thought best adapted to their growth; that the general width of the hole was nearly a foot square, the depth varying according to the size of the roots. Oak, ash, &c. have most commonly long tap-roots; the different kinds of fir have in general fibrous and spreading roots. The number of plants upon an English acre at seven feet distance, five score to the hundred, will be 889; which multiplied by eleven, the number of acres planted will make 9779 plants. In my statement I mentioned 9665, which makes a trifling difference. I am

happy

happy in adding, that at present the plantation is in a very flourishing state; and I have the honour to be

Yours, etc.

WILLIAM SMITH.

Craike,
May 21, 1800.

Mr. CHARLES TAYLOR.

The

The GOLD MEDAL, or THIRTY GUINEAS, at the option of the Candidate, being the Premium offered for planting ORCHARDS, was this Session adjudged to Mr. JOHN LAKE, of Radfield, near Sittingbourne, in the county of Kent, from whom the following Account and Certificates were received, and who made choice of the pecuniary Reward.

SIR,

OBSERVING in the annual publication of the Society for the Encouragement of Arts, etc. an account of premiums offered to the person who shall have planted an Orchard after August 1796, in the most judicious manner, not less than four acres in extent; I request you to lay before the Society the following account of my performances, wishing both to coincide with the views

views of the Society, and acquire some reputation as an Orchardist.

With due regard to the instructions in the volume of the Society's Transactions, during the months of October, November and December, 1796, the land was prepared, and trees planted. No. 1 contains something more than six acres, and is chiefly a strong loam intermixed with flints; these have not been picked off, as from experience it is found to be a material injury to the land to do so. Nearly three acres of this field had been planted with hops two years; and the remaining part, a turnip fallow, was sown with wheat, after the turnips had been fed on the land by fattening sheep, who were likewise fed with oil-cake and beans, with a view to enrich the soil, which, though kindly, was considered as poor. All this was done, and the wheat sown previously to the trees being planted.

Observing too, that, in the Society's Transactions, attention to *shelter* is

strongly recommended, in the month of March following the whole was filled up with hops; this breadth of land being very well situated for this purpose, by plantations, already raised, of Spanish chesnut, ash, etc. on the south-east, and to the west an extended shaw of chesnut, the north and north-east being exposed. Thither I directed a plantation of hawthorn, which has taken good possession of the ground. On two acres towards the south, all are standards, planted thirty-two feet and a half asunder, making forty-one per acre. After this, in order to gain experience, and raise more shelter, I planted the remaining part, about four acres and a quarter, with standards, in a similar manner; then the rows, to this last-mentioned part, were filled up from south-east to north-west by two espaliers, or dwarfs, between each standard tree. The greater part of these dwarfs promise so well, that I have my doubts whether they will not outrun the standards. Be that as it may,

may, each is to be kept regularly pruned, so as not to intrude on the other, and, if possible, to be so left that the trees uniting shall form an actual hedge of fruit, feathering down to the ground. The whole of these standards and dwarfs are apples. I am sorry to observe, that I fell into an error in sowing wheat after the turnips, as the manure, left by the sheep, produced so luxuriant a crop, that the dwarfs on that part, about an an acre and a half, suffered very considerably, notwithstanding great pains were taken by hoeing and clearing the wheat plants several times to a considerable distance. The mischief produced was owing to the crop lodging entirely over the heads of the dwarf trees. They are now rapidly recovering.

N° 2. Farther still, as I have generally observed that when the hops are displanted, the fruit-trees experience a check for several years, and many are often irrecoverably lost; to be convinced of the best mode of raising an Orchard

with or without hops, I planted another at the same time with standards only (all apples), at the distance of two rods, forty trees per acre. This field contains something more than four acres; the situation at the distance of a mile from the other, in an adjoining parish. It has been arable land beyond memory; the soil a dry, hazely loam, to a great depth, and free from flints: it had previously been well cultivated and manured. I do not mention this Orchard as perfect; for, from being confined to a particular sort of apples, considerable difficulty arose in selecting the plants: but it is my opinion, that, twenty years hence, it will make a fine appearance.

For the purpose of guarding this plantation, a shelter of elm, chesnut, and willows, have been planted on the north and east points. The west is fully guarded by a thick elm hedge. Wishing to form each Orchard as near to perfection as possible, a regular attention has been paid to pruning, and likewise taking

taking away the bearing buds, so that no fruit has yet been produced. From the very beginning of this undertaking, I was assiduous in choosing what we deem the proper soil. The manual part has been conducted on the new system of close-pruning, cleanliness and care. The trees, from growing freely, have but very little tendency to moss. The few spots which have appeared this year, I intend to have washed away before the next spring, and likewise to make use of oil as a preservative against this evil.

I shall take due care to send up proper certificates of all the transactions; and should the Society deem my endeavours deserving their reward, I shall feel myself highly honoured by such mark of attention.

I am, SIR,

Your most obedient servant,

AN ORCHARDIST.

Oct. 31, 1799.

To the SECRETARY.

I, Bryan Faussett, of Sittingborne, in the county of Kent, Attorney at Law, having this day attentively examined and inspected two plantations of fruit belonging to Mr. John Lake, of Bapchild, one of which lying at Wood-Street (his own estate there), and the other on an estate belonging to Thomas Skip Dyot Bucknall, Esq. in the adjoining parish of Tonge, do hereby, for the information of the Society for the Encouragement of Arts, etc. certify, that the plantation No. 1, at Wood-Street, contains, according to an admeasurement thereof, taken by Mr. Hogben, now shown me, and hereunto annexed, in the whole six acres, thirteen perches; part thereof, containing four acres, one rod, seven perches, being planted with standard apple-trees at about thirty-two feet and a half asunder, in rows, in the direction from south-east to north-west, with two dwarf apple-

trees

trees between each standard; and that all the trees, both dwarf and standards, appear to me to be in a very vigorous and flourishing state: and, as they appear remarkably healthy, and have made very fine shoots, they promise in a short time to be an extremely profitable Orchard. I also certify, that the other plantation, No. 2, in Tonge (called Pantrys), containing also, according to Mr. Hogben's admeasurement, four acres, one rod, thirty-six perches, is planted with standard apple-trees only, at the rate of forty trees on an acre, or thereabouts; and that those trees, though not to appearance in so vigorous a state as the others at Wood-street (which I imagine may be owing to the different state of cultivation, the one at Wood-Street being now planted with hops, and the other at Tonge being old corn land, and now in corn land), yet, nevertheless, they appear to be alike healthy, and the bark or rind of each remarkably smooth and clear,

and free from moss, as are the trees at Wood-Street; that great pains have been taken, and attention paid by Mr. Lake, to procure shelter to each of the plantations, by judiciously planting in the hedge-rows a quantity of ash, elm, willow, chesnut and hawthorn, on the cold sides thereof, which, no doubt, will be a great means to help the trees, and preserve them from the bleak cutting wind and blights. Given under my hand, this sixteenth November, 1799.

BR. FAUSSETT.

I WILLIAM FAIRMAN, of Lynsted, in the county of Kent, Esq. a Member of the Society for the Encouragement of Arts, etc. have inspected the lands, fruit-trees, and live fences, belonging to John Lake, of Bapchild, Gent. and do certify, for the information of the said Society, that I find the two Orchards specified by Mr. Hogben, Land-Surveyor,

veyor, in a very growing and well-managed state; more particularly the dwarf and standard apple-trees, in point of vigour, in Orchard, No. 1, from its being in high culture as a hop-garden; and it is mentioned to contain six acres, lying in the parish of Bapchild. I must beg leave to observe that the system of planting two dwarfs between each standard, from this attempt, gives great encouragement to those who may inspect their progress, and desire to raise Orchards, as it very much obviates the discouragement many persons feel in being obliged to wait so great a length of time for the standards getting into bearing; as the dwarfs, if they are planted of a proper size, may be suffered to bear the second year, and will produce abundantly till the standards require the ground they occupy; which will be readily given up when they arrive at that size, as the dwarfs by that time will have completed their business, and

the

the live-fences, which are now in so thriving a state, will then form a complete high shelter. I must beg leave further to certify, that a more skilful and attentive man could not be selected than Mr. John Lake to carry this system on to maturity, as you may depend on his ingenuity and perseverance.

WILLIAM FAIRMAN.

Miller's House,
December 5, 1799.

THIS is to certify, that we, whose names are underwritten, were employed by Mr. Lake, of Radfield, to plant upwards of ten acres of land with standard and dwarf apple-trees. The piece at Wood-Street, in Bapchild parish (about six acres), we planted first with standards, thirty-two feet and a half asunder, and with forty-one trees per acre, this distance best suiting the hop cultivation; for nearly half this land was already planted with hops, and the remaining

remaining part was planted the following spring. On something more than four acres of this land, we added, in the rows from south-east to north-west, two dwarfs between every standard, making eighty-two per acre. On the land called Pantrys, in Tonge parish, containing about four acres, we planted standards only, thirty-three feet asunder, and forty per acre. This land was sown with wheat previous to the planting. On the outside we planted a great number of young elms, willows, chesnuts, and hawthorns.

The whole was executed between the month of October, 1796, and the latter end of January, 1797.

JUSTINIAN CHAMPION, per *mark*.
WILLIAM CARPENTER, per *mark*.

Signed in presence of
WILLIAM LAKE, of Bapchild.

Nov. 16, 1799.

[A further account of Mr. Lake's Orchard, with an engraving thereof, will be found in a subsequent paper on Blight, by T. S. Dyot Bucknall, Esq. See *Plate VI.*]

The

The Sum of TWENTY GUINEAS, being the Premium offered for planting and drilling, between the first of December, 1797, and the first of April, 1798, the greatest quantity of Land, not less than ten acres, with BEANS, and having sown the same land with WHEAT in the same year, 1798, was this Session adjudged to JOHN CARTWRIGHT, Esq. of Brothertoft Farm, in the county of Lincoln, from whom the following Account and Certificates were received.

SIR,

THE inclosed Account and Certificates will explain, in as few words as perspicuity will allow, my culture of Beans and Wheat.

The soil was a hazle-coloured stiffish loam, worth about thirty shillings per acre per annum. In 1796 it had been fallowed

fallowed without dung, and sown with rape, which was eaten off by sheep. In 1797 I had oats on one earth, and in 1798 beans. The operation of sowing Beans began the 2d of February, and was carried with *sets* of ploughs, three ploughs in a set.

The ploughing was so arranged, that the seed was sown in every third furrow, which set the rows twenty-seven inches asunder. The plough, of course, turned over a flag of nine inches. One of the ploughs of each set was drawn by a pair of horses a-head, the other two ploughs by a pair of horses a-breast; and to one of the latter was attached Amos's Drill Apparatus, the coulter of which opened a drill, three inches deep, in the line of union between the flag then turning over and the preceding flag.

With a set of ploughs three in number, and so equipped, every practical farmer will know how to set his ridges, and how to turn every third flag with the drill-

drill-plough, with the least loss of time; as the next adjoining land will always find employment for one of the common ploughs, while it can be spared, after turning its first flag in a land, and until the other common plough, and the drill-plough, have set the ridge of the land, and sown the two first rows of Beans. The plough equipped with horses a-head, or what is termed *single*, is used for turning a narrow flag in the finishing of each land, and for making the water-furrows.

After thus ploughing and sowing, the land was harrowed three or four times, as it required that operation, more or less. The lands being only nine feet wide, I used three harrows tied to a pole of at least that length, so that the horses, drawing at its two extremities, walked in the open furrows, between land and land. After harrowing, the water-furrows were opened by the plough with horses going single, and finally gripped with

with the spade wherever it was necessary to a complete drainage.

As soon as the Beans showed themselves above ground, a one-horse roller was used, and after it light harrows ; the horses being kept in the intervals between the rows of Beans. These operations, in some degree, destroyed the weeds, furnished earth to the Beans, and prepared the land for the use of the horse or hand hoe.

The subsequent management began with an old plough originally made nine inches wide, but for this purpose reduced to six inches. With this instrument passing close by the side of the Bean-rows, the earth was turned from them, and of course a ridge of loose earth was raised in the middle of each interval. The Beans thus left on a narrow ridge of earth, were well hand-hoed, and perfectly cleared from weeds.

As soon as the weeds were dead, the narrow plough was again used, and with

one

one horse, whereby the ridge of loose earth above-mentioned was split, and part of it thrown to one row of Beans, and part to the other row. In two or three weeks afterwards the rows of Beans were cleared from weeds by hand-picking, and again earthed up by Amos's expanding horse-hoe. If the land had been stiffer, a strong double-mould-board plough would have been necessary for this last-mentioned operation, which finished the culture. In harvesting they were cut with a reaping-hook, and tied in sheaves.

Not having bands enough, which in this country are sometimes made of a species of slight reeds which grow in our ditches, and sometimes of straw, I learned from a labourer to tie the sheaves with the bean-straw. A neighbouring gentleman uses rope-yarn, and states, that by taking care of them while thrashing they will last three seasons.

In 1799, the land, clean and in good order, was sown with Wheat. Where

weeds

weeds partially appeared, we scuffled the weeds, collected them with harrows, and burnt them.

Amos's Drill-Plough and Expanding Horse-Hoe are particularly described in his Theory and Practice of Drill-Husbandry, where his Drill Machine, of which I make great use, is likewise fully explained.

By setting the regulator of the Drill-Plough, the quantity of seed to an acre may, according the distance of the rows, be determined, as shown in this table:

Quantity of Seed per Acre.	*Distance between the Rows.*	*Revolutions of the Land-Wheel for one Pint of Seed.*
12 Pecks	20 Inches	18 Revolutions.
12	24	22
10	27	16
9	27	16
8	30	18

I remain,

SIR,

Your obedient Servant,

J. CARTWRIGHT.

Mr. TAYLOR.

I William Amos, Agent to John, Cartwright, Esq. of Brothertoft-Farm, in the county of Lincoln, do certify as follows, viz.

First, That between the first day of December, 1797, and the first of April, 1798, my said master sowed upon his said farm, in drills from twenty-seven to thirty inches apart, seventy acres with Horse Beans, at the rate of ten pecks of seed per acre, all which land was sown with Wheat in the said year 1798, except ten acres, which were again sown with Beans.

Secondly, That the operation of drilling began the second of February, 1798, and was finished the seventh of March, and was performed by means of a drill apparatus attached to common ploughs* (on

* Mr. Amos, for a particular account of his Plough and Drill Apparatus, refers to his publication on the Theory and Practice of Drill-Husbandry, printed for J. J. and G. Robinson, in Paternoster-Row.

(on a principle communicated by the undersigned to Arthur Young, Esq.) at an expence of about six shillings per acre, including a full ploughing, and harrowed at two shillings an acre.

Thirdly, That the said Horse Beans were horse-hoed four times, viz. twice skim-hoed, and twice earthed up, at an expence of four shillings and sixpence; hand-hoed once, at three shillings and sixpence; hand-weeded, at one shilling and sixpence; and gripped for about ninepence per acre.

Fourthly, That the said Beans were shorn at 9s. 10s. 10s. 6d. and 11s. per acre, averaging ten shillings per acre. The shearing commenced the twenty-seventh of August, and ended the eighth of September.

*Fifthly, That the produce was four quarters and a half, Winchester measure, per acre; the soil, in general, a pretty good loam, but some more clayey: it was from four to eight inches deep,

the substratum being partly fine sand and partly clay.

*Sixthly, That the straw being too coarse for cattle to eat, it was used as litter in the stables and fold-yards.

WILLIAM AMOS.

I, GEORGE BAMBERGER, Clerk to John Cartwright, Esq. do certify, That I know the particulars marked * in the above Account to be correct, and have reason to be perfectly satisfied that all the rest are so likewise.

GEORGE BAMBERGER.

Nov. 1, 1799.

Mr. TAYLOR.

The

The GOLD MEDAL, or THIRTY GUINEAS, at the option of the Candidate, being the Premium offered for cultivating the TRUE RHUBARB, was this Session adjudged to Mr. THOMAS JONES, of Fish-Street-Hill, from whom the following Account and Certificates were received, and who made choice of the pecuniary Reward.

SIR,

THE Certificate which accompanies this communication, will inform the Society that I have planted, in the year 1799, four thousand and fifty-three plants of the Rheum Palmatum, or true Rhubarb; I once more, therefore, present myself as a claimant. Each time I have made my appearance in this character, I have pledged myself to future and more considerable exertions; for every distinction with which they

have honoured me, has been viewed in no other light, than that of a powerful incentive to perseverance; and I need not add, how much gratification it will afford me, if the Society, by their decision on the present occasion, continue to me their good opinion.

The period I have devoted to the cultivation of this valuable drug has now become of a sufficient length to prove experimentally the truth or falsehood of my theories. Happy am I in reflecting, and happier still in communicating to the Society, that since I last had the pleasure of addressing them, I have additional reason for satisfaction. In my former papers (see Transactions of the Society, Vol. XI. XV. and XVI.) having been, perhaps, more than sufficiently minute in describing my system of cultivation, I shall now only notice the nature of the soil and aspect; the former of which is a rich sandy loam, and the aspect inclining to the east and south: and, as the pub-

lic

lic are in complete possession of the opinions upon which it is founded, there is no occasion to repeat every particular point in the present instance. I shall therefore content myself with merely mentioning some, and enlarging upon others, as necessity may require.

Conceiving it to be good policy for a man to avail himself of every advantage that is presented, I have recommended spring as well as autumnal sowings, and the plants of each, when arrived at a proper size, to be placed in the nursery-bed, at its opposite season. I persevere in this practice, lest the summer, in proving too dry, should be equally detrimental as too wet a winter: but as draining the seed-beds may be so easily effected, and the safety of the plants necessarily ensured; so now, without on any account neglecting the former, I principally depend on the latter sowing for a succession: besides, it is attended with the least trouble and expence; and if

throughout the operation is well attended to, success is nearly reduced to a certainty.

Again, I have somewhere observed, that a proper mode of cultivation would greatly facilitate the cure of this root; in other words, good management will ensure its welfare till its arrival to a proper age: and that this has ever appeared to me of the most absolute necessity, I have never failed to represent. By nothing else can it acquire that degree of woodiness, in which I suspect the principal secret of its cure consists. Age too is necessary to give the plant its proper growth; otherwise, when it undergoes the operation, its pieces will be diminutive, insignificant, and unprofitable. Above all, it is entirely indebted to age for its medical virtues; and I firmly believe, that to this, more than to soil or situation, it is owing that Turkey has been considered superior to the English Rhubarb.

In this place permit me to introduce an opinion that I have for some time entertained

tertained, viz. that those parts of the root are of the finest quality that are the farthest removed from the seed. This difference is easily discoverable from its earliest stages; and so assured am I of the fact, that, but for want of a supply of offsets, and one or two other considerations, I should be almost tempted to abandon my present, in favour of this mode of cultivation. But though, in this respect, the Rhuburb is evidently superior, yet it should be recollected that the other is less precarious, and its growth and produce much more considerable.

Although, according to every public testimony, of which mention will presently be made, I have reason to believe my progress has been more considerable than that of my contemporaries, if there are any, yet I have no conception that we have arrived at the *ne plus ultra*. Let us rather hope, that every succeeding year will be productive of a degree of improve-

improvement proportionate to the advantages of increased experience. As we are so much indebted, therefore, to the age of our plants, let me caution all who have, or may engage in this undertaking, never to yield to impatience; for, with a few persons, the prejudices against the English Rhubarb are many, and deeply rooted; and to this source most of them may be traced. Nor is this very wonderful; for to entertain high expectations of Rhubarb prematurely taken up, is no less extravagant, than to suppose the capacity of a child equal to that of an adult: yet hitherto our market is a stranger to any other than such a commodity.

Another cause may, I conceive, arise (notwithstanding the length of time since the introduction of the palmated, or true sort, into this kingdom, and all that has been written on the subject), from the little or no care that seems to have been taken in selecting and planting it. As

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a proof of this, it is not many days since I saw a considerable quantity, and neither the purchaser nor planter knew it to be the rhapontic. In justice, however, to medical gentlemen in general, but in particular to those I have consulted upon this subject, I have found them better informed, and liberal to the greatest degree. They entered at once into the views of the Society, and their assurances of co-operation have been fully realized. That I never expected to introduce it into general practice without opposition, is evident from my last papers in 1798; for I there remarked, that very probably, before this could be effected, certain difficulties must be overcome, the principal of which I apprehended to be an almost universal prepossession in favour of foreign commodities. Moderation on the part of the cultivator in the regulation of his prices, and an unwearied attention to its quality, are the only means likely to produce a counteraction. To great

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attention to these points I attribute all my success. Mere recommendation ought ever, in such a business as this, to be placed out of the question. If the article will not bear the tests of examination and trial, it should not be indebted to any thing else.

Whenever I have submitted any specimens to public examination, at an hospital or elsewhere, my constant language has been, "I have no wish but that they may rise or fall according to their own intrinsic merit or demerit; and if worthy of approbation, by this mean induce their general adoption. That this being, no doubt, the ultimate object of the Society of Arts, who have thought proper to honour me with several distinctions, I feel myself impelled to forward it to the utmost, and not remain contented with its mere cultivation." I have proceeded to state the great expence this country incurs by so large an importation, and on this account urged its general

general adoption, in order to lessen the expence on the score of duty. That although I am influenced by such motives, and many others, yet my own individual interest I have at the same time fairly acknowledged to be among the the number; and I have concluded with expressing an hope, that while pleading the general as well as my own particular cause, perhaps the benefit of their institution may be the necessary consequence of introducing a valuable and efficacious medicine, at a comparatively trifling expence. I have never yet made this appeal in vain; and the Society will, I dare say, receive with much satisfaction the intelligence that Rhubarb of English growth is now used at Guy's (I mention the hospitals in the order of its introduction), St. Thomas's, and St. Bartholomew's; and is under trial at several others. Still further to inform myself of the public opinion, I lately requested an interview with a numerous and most respectable com-

committee at Apothecaries-Hall: it is impossible, without a breach of propriety, to repeat the compliments its members were pleased to pay me. Whether I deserve them or not, it would be equally improper in me to determine; but of this the Society may be assured, I never will rest till I do. In a word, my purpose was fully answered. The article which I exhibited met with the most unqualified approbation, and full permission was given to publish this circumstance. I beg leave, before I conclude, to apologize for the egotism which prevails throughout this communication. It is scarcely possible to avoid it, when, in cases like the present, a man is under the necessity of speaking of himself.

It is a subject I have much at heart, and it would give me much real concern to keep back a single circumstance likely to be useful to future adventurers. Its production and adoption, with the attendant difficulties, have been to the best

best of my abilities amply considered; the former in the communications beforementioned, the latter in this paper. If the Society are of opinion that the steps I am pursuing to effect this last and desirable purpose deserve success, it will be highly flattering. Under their auspices I commenced my plantation eight years ago, and I hope and trust my proceedings since have been such that the purpose to which it has been appropriated will occasion no regret.

I am, SIR,

Your very humble Servant,

THOMAS JONES,

No. 13, *Fish-Street-Hill.*

Mr. CHARLES TAYLOR.

This

THIS is to certify, That Mr. Thomas Jones, of Fish-Street-Hill, London, has planted four thousand and fifty-three plants of the Rheum Palmatum, or true Rhubarb, in a piece of ground which he rents in this parish.

They were planted in the year 1799, at four feet distance from each other, and have been in a very flourishing state through the last summer.

PETER LEVESQUE.

Enfield,
Feb. 8, 1800.

SIR,

I HAVE taken the earliest opportunity of answering your letter. I can assure you that I have planted for Mr. Thomas Jones, of Fish-Street-Hill, in the parish of Enfield, four thousand and fifty-three plants of the Rheum Palmatum, or

or true Rhubarb, all which are in a healthy state, as is well known to the inhabitants of Enfield, as well as myself; and I flatter myself finer plants never were seen. No expence has been spared in raising such a great number of plants.

I am, SIR,

Your obedient Servant,

JOEL ROWSELL,
Gardener.

Enfield,
March 13, 1800.

SIR,

IN answer to your request respecting the Certificate of Mr. Jones, I beg leave to inform the Society that the signature attached to it is mine. In the course of last summer, I had frequent opportunities of seeing the plantation, which, from its singular beauty, not only attracted my observation, but that of

all the neighbourhood. I have witnessed the progress Mr. Jones has made in the cultivation of Rhubarb from its commencement, for I believe that the first plants which he produced were raised in my garden.

I am, SIR,

Your humble Servant,

PETER LEVESQUE.

Chase Side, Enfield,
March 12, 1800.

Mr. CHARLES TAYLOR.

The

The GOLD MEDAL, being the Premium offered for improving WASTE MOORS, was this Session adjudged to JOHN MIREHOUSE, Esq. of Brownslade, in the county of Pembroke, from whom the following Account and Certificates were received.

GENTLEMEN,

I TAKE the liberty of laying before you the particulars of an improvement effected by me in a distant county, upon a tract of ground of two hundred and seventy-four acres, heretofore a common, and so drowned by total neglect, as to be of no value to the public (unless the grazing and starving a few cottagers cows on its borders can be deemed such), but often in a dry summer proved an inconvenience to the neighbourhood.

The Lord of the manor in which this land is situated, having himself the prin-

cipal right in it, obtained from his copyholders, a few years since, the exclusive property for a very trifling consideration, they never having derived any advantage from it; and for his better security he obtained an act of parliament for its inclosure and drainage.

The land lies between two hills; is about two miles in length, and about a quarter of a mile in breadth; is very flat, and about a quarter of a mile from the sea. The upland water flowing upon it in various places, and having no outlet or passage to the sea, it became a morass inaccessible to cattle, except on its borders. The land lying between it and the sea is an entire sand, through which, in the course of the summer, much of the water made its escape; and, in the winter, frequently flowed over the surface of the sand to the sea-beach, where, having been insulated till it ran over the beach also, it at length forced a passage, which, in the course of a few tides, was completely closed again.

In

In this state the land has probably continued for ages. In the course of the summer it produced sedge and coarse grass, which, dying in the winter, formed a surface, that, when cut, appeared to contain nothing but vegetable substance. Of this surface nearly three-fourths of the whole consisted: the remainder (being the borders adjoining to the high land), having received the waste from them, is raised above the level. This was of course less wet, and contains a fine rich mould of various depths, from one to three feet, below which, in some parts, clay is found, in others, the vegetable substance before described, and in nearly the same state. In the interior of the flat this substance continues to a great depth; indeed, no bottom has yet been found.

The Lord of the manor having obtained his act of parliament, my residence being within a mile of the common, I

proposed to take a lease of it, and bring it into cultivation, provided he would on his part undertake the expence of cutting a drain from the lower end of the common to the sea beach, and of laying down a tunnel through it, according to my directions, by which a regular discharge of water might be obtained. This being effected, and the tide properly guarded against, my lease was settled, and I immediately proceeded in the drainage.

I began by forming the channel on the north side, and by dividing the land into twelve pieces (according to the plan sent herewith) by double ditches of such depths as the fall would allow, from a few inches to four feet. Between the ditches, a space from thirty to forty feet was left for planting willow, (this is successfully executed), as well for shelter as for other purposes. The land, being saturated with water, appeared a perfect sponge, and, as the drains began to take effect,

sunk

sunk prodigiously; so that, after repeatedly lowering the ditches from the very tunnel upwards, the surface of the water remained at the same, or nearly the same distance from the surface of the land. Having, however, repeatedly sunk the principal drains and ditches, I at length obtained, about three feet from the water to the surface of the land, *in the lowest parts*, and in others a level fully sufficient for all my purposes.

The cross ditches empty themselves into the drain on the north side, as far as the letter A on the plan. At this point it became necessary, from the low level of the middle parts of No. 8, 9, to close the north end of the ditches, to keep out the flood; and an internal drain was made, in consequence thereof, through the lowest point of these pieces (as described in the plan), unconnected with the principal drain above, but discharging itself into it at the lower point.

The common being thus inclosed and divided, and the ditches being of sufficient depth, I proceeded to drain each division by small internal cuts, about twenty inches wide at the top, of various depths, to three feet and a half, bringing them to six inches in the bottom; leaving those open which were in the direction of the plough, and filling up others with brushwood, which interfered with it, or with the sod which had been cut out of them as a hedge, and, being placed lower in the drain, left a hollow in the bottom. Both these drains answer to my entire satisfaction, and the whole of the land is brought into cultivation. I have expended in this undertaking the sum of five hundred and eight pounds, as certified by the person through whose hands the payments were made to the labourers and others.

The course of husbandry which I pursued, I have particularly described in a memorandum annexed, and numbered as

as the pieces in the Plan; but I beg leave to remark, that the crops of coleseed, as a winter food for sheep, have generally been very fine, and have enabled me to feed great numbers of sheep in the months of January, February, March, and April, and to make them more fat, and in less time, than I have ever been able to do on turnips of the best quality upon my home grounds. The crops of wheat likewise have been very good, and the grain weighty; but the crops of barley and oats have rarely succeeded to my satisfaction. The land on the whole, from being of no value, is already very productive, and will probably, in a short time, become the most valuable meadow of the neighbourhood. The vegetable substance, by being drained, is become a fine luxuriant black mould to the very surface of the water, and grows daily less spongy and more adhesive.

If

If the Society for the Encouragement of Arts, &c. should be of opinion that my exertions are deserving their attention, I shall consider myself as highly honoured.

I have the honour to be,

GENTLEMEN,

Your most obedient

humble servant,

A PRACTICAL AGRICULTURIST.

January, 28 1800.

To the Society for Encouragement of Arts, &c.

Particulars

Particulars of the Husbandry adopted in each Division of the Land improved by a Practical Agriculturist.

See Plan annexed

THIS piece lies on the high-
est level, and consists of a
rich earth washed from the ad-
1794 jacent country. It is drained as
the lines are dotted. After once
1795 ploughing, it was sown with oats,
and again with oats after two
ploughings, and sown with grass-
seeds.

1796 The season turning out very
wet, it was much poached by
cattle, and therefore ploughed
1797 up in the winter, and brought
into order for barley. The pro-
duce, a fine crop.

1798 Drilled beans three feet apart;
the crop but indifferent, but in
1799 good order for wheat; and the
wheat-

wheat-crop very fine, notwithstanding the season.

1800 Ploughed up, and prepared for cole-seed.

No. 2. This division was very wet. It had obtained but little of the wash from the country; but having a good fall to the north, was drained, as described, having also other smaller drains covered, and emptying themselves into those that were parallel. Having been formerly cut for fuel by the adjacent poor, it was full of holes. Levelled and pared the surface with a fen-plough from Cambridgeshire; and having well burnt

1795 it, sowed it with cole-seed, which being eat off by sheep, after once ploughing, it was sown with bar-

1796 ley and Dutch clover. The former was a fine crop; but the corn lean. Grazed the clover, which being almost choaked with the natural

1797 natural grass, was ploughed up, and (after one ploughing only) sowed with wheat. This produced a slight crop, but fine and
1798 heavy grain. In the succeeding spring, got into good condition,
1799 and burnt it slightly, and sowed with cole-seed; a good crop al-
1800 ready eat off, and preparing for spring wheat.

No. 3. Equally wet, and in the same state with No. 2. Drained, as described in the plan; but with other intermediate covered drains.

1795 Levelled and sown with cole-seed; a good crop, and, after
1796 once ploughing, sown with oats and Dutch clover: the oats a moderate crop; the clover better
1797 than No. 2, but was soon choaked by the natural grass; continued and remains in grass.

No. 4. Very wet; drained as before, but much of the ground covered with

with water; has never been ploughed; produces good crops of hay (a small part of it having been cut for fuel). It is intended
1800 to be burnt, and sown with cole-seed this year.

No. 5. Three-fourths of this piece remarkably good; the whole in grass; and the remaining fourth being uneven, will be burnt and sown with cole-seed this year. Both these pieces are well drained.

No. 6. Drained as before. Was well
1798 burnt and prepared for cole-seed, and after being eat off by two hundred sheep, and making them
1799 very fat, was sown with barley.—Great bulk—but the corn lean, and hurt by the wet harvest.—Late in the season, the weather allowing, it was twice ploughed,
1800 and sown with wheat in good condition, and now promises remarkably well.

No. 7.

No. 7. Drained as before, but with more labour. — Prepared and
1796 burnt for cole-seed.—The produce abundant.—After the cole-seed was eat off, it was sown with
1797 spring-wheat the 20th of February. The crop appeared good during the summer; but the season being wet, it did not ripen well, after two ploughings.—Sown
1798 with barley—great bulk, but lean corn. — Prepared and slightly
1799 burnt for cole-seed.—The crop was great as before, and at this time supports three hundred and thir-
1800 ty-four sheep. It is intended for oats and seeds.

No. 8. This division was very wet, and required much labour of drainage. The land becoming more flat, the fence-ditches no longer empty themselves into the principal drain. A cut is made from the ditch at A, in the lowest part

of

of the land parallel to the principal drain, which receives the water from the smaller drains, as described. It was partly sown
1796 with oats, and partly fallowed (but imperfectly), and the whole
1798 sown with wheat in the autumn, and turned out a better crop than I had reason to expect. It was
1799 afterwards completely drained, and got into excellent condition
1800 for wheat last autumn, and now promises remarkably well.

No. 9. Very wet and very rough; was
1798 prepared and burnt for cole-seed,
1799 and succeeded by barley after two ploughings.—Both crops tolerable, but the barley lean, as before stated. It was at the same
1800 time sown with Dutch clover and rye-grass, and promises well.

No. 10. This piece lies lower than any other part of the flat, and was originally almost entirely covered with

with hillocks of hassock, many of which were three or four feet in height (several of the other pieces had likewise many of these hillocks which contained no soil or earth, but were accumulated sedge and coarse grass). It was with much labour burnt, and got
1796 into order for cole-seed.—Produced a fair crop; was sown
1797 with oats and grass-seeds, and continued in pasture. The whole is now become a black earth, and
1800 carries a great deal of stock; but it has not been mown.

No. The level of these two grounds
11, 12 rises from No. 10 to the extremity of the flat, and is consequently much dryer. Both these grounds
1797 were prepared and burnt for cole-seed, and in the succeeding spring
1798 sown with oats and barley—the
1799 crops good: after three ploughings were again sown with spring-

corn, Dutch clover, and rye-grass. The crop was but indifferent; but the seeds promise well.

A PRACTICAL AGRICULTURIST.

Jan. 28, 1800.

I HEREBY certify, that the land reported by "A Practical Agriculturist," to the Society for the Encouragement of Arts, &c. was a common surveyed by me previous to its being inclosed; that it comprises two hundred and seventy-four acres, or nearly, of which one hundred and seventy-three are now pasture, and one hundred arable; that when surveyed it was a morass, and so overflown with water, that I could not finish the survey without additional trouble, from being unable to go over it;—that the plan, proposed to accompany this account, is a copy of my original survey, with the addition of the ditches

ditches and fences since made;—that from being totally unprofitable, and for the greatest part inaccessible to stock, it may be considered as an entirely new creation, being drained, and in the cultivated state described in the Plan;—and from my knowledge of its original state, and its present condition, that the sum of 500l. stated to have been expended, has been well and judiciously disposed;—and that, if occupied in one holding, it would let at an average rate of fifteen shillings per acre; but if let to the farms adjoining it, in small lots (for which it is peculiarly adapted), for considerably more; and that, after a very few years, its value will be greatly increased by the solidity which it will attain, and the continuation of the system pursued for its improvement.

JOHN HAND.

Jan. 15, 1800.

I HEREBY certify, that the land reported to the Society for the Encouragement of Arts, &c. by the gentleman whose signature is "A Practical Agriculturist," is situated in the parish of which I am Vicar; that, previous to his undertaking the improvement, it was a common totally unprofitable from its being generally inundated;—that it is now in a fine state of cultivation—produces good crops, particularly of coleseed and wheat—keeps a considerable number of cattle when depastured, and yields abundant crops of hay;—and that this important improvement has been effected by the gentleman above alluded to, of which, from my local situation, I have been almost a daily observer.

CHARLES PIGOTT PRITCHETT, Vicar.

Jan. 24, 1800

Mr. TAYLOR.

PLAN

No. I.	
1794	Oats
1795	Ditto
1796	Grass Seeds
1797	Barley
1798	Beans
1799	Wheat
1800	Fallow

No. II.	
1795	Cole-seed
1796	Barley
1797	Clover
1798	Wheat
1799	Cole-seed
1800	Spring Wheat

No. III.	
1795	Cole-seed
1796	Oats
1797	Clover
1800	In Grass

No. IV.
In Grass

No. V.
In Grass

No. VI.	
1798	Cole-seed
1799	Barley
1800	Wheat

No. VII.	
1796	Cole-seed
1797	Spring Wheat
1798	Barley
1799	Cole-seed

No. VIII.	
1797	Oats and Wheat
1798	Wheat
1799	Fallow
1800	Wheat

No. IX.	
1798	Cole-seed
1799	Barley
1800	Grass Seeds

No. X.	
1796	Cole-seed
1797	Oats
1798	Grass Seeds

No. XI.	
1797	Cole-seed
1798	Oats
1799	Ditto
1800	Grass Seeds

No. XII.	
1797	Cole-seed
1798	Barley
1799	Oats
1800	Grass Seeds

PLAN OF LANDS

In the County of Pembroke,

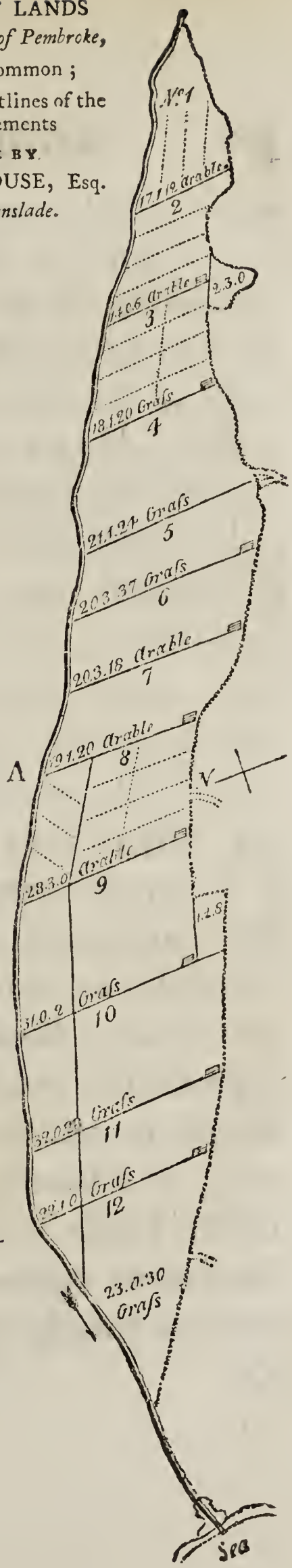
Lately Common;

With the Outlines of the Improvements

MADE BY

J. MIREHOUSE, Esq.

Of Brownslade.



The GOLD MEDAL, being the Premium offered for GAINING LAND FROM THE SEA, was this Session adjudged to the Rev. HENRY BATE DUDLEY, of Bradwell-Lodge, in the parish of Tillingham, from whom the following Account and Certificate were received.

SIR,

A TRACT of land which I inclosed on the same line of coast within this parish about eleven years ago (for which I was then honoured with the Society's Gold Medal), being already under a profitable course of tillage, I was induced to undertake the present inclosure, as a lessee of the collegiate estate of St. Paul's. The front line of embankment against the sea is nearly one mile in length, and, with the returning banks

banks on each wing to the old wall, forms an inclosure of contents, as expressed in the certificate already in your possession. The whole of the embankment is composed of earth alone, borrowed from the irregular salting land in the front, called *chatts*, and taken at the limited distance of twelve feet from the base of the new work, to leave a sufficient foreland for its protection. I found, from experience in my former embankment, that I had not given it a sufficient angular declension in front, for an easy ascent and descent of the waves. This error was therefore corrected in the last work. I began it on a base of thirty-two feet, and wrought it to the height of seven feet, leaving it a plane of five feet on the top, and making the land side of the embankment, as nearly perpendicular as the security of the base would allow.

Within, on the land-side, is cut a ditch twelve feet wide, five feet deep, and four feet at bottom; the earth from which

was thrown into the mound. My former sea-embankment in Bradwell parish had nearly given way to the great inundating tide of February 1792, from this erection of new earth being made on the surface. To guard against similar danger in the present work, a spit-deep trench, six feet wide, was previously cut along the centre of the whole line, on which the mound was to rest; this, by admitting the new earth into an incorporative adhesion with the base soil, renders a future separation almost impossible. Before this, the main rills had been filled and rammed, to give these parts equal solidity with the rest.

The whole operation was performed by a gang of twelve sea-wallers, with barrows and planks only, at one pound ten shillings the marsh rod of twenty feet, and perfectly inclosed in seven months: but it must be observed, that the soil, composed of rich vegetable matter, is without one particle of stone

or gravel, and cuts with an iron-edged scoop-tool, so as to load the barrows with great facility. At each end of the front line is laid an out-fall gutter, or sluice, through the whole embankment, five feet in width, by three feet deep, clear in the run; and another of smaller dimensions in the centre, for discharging the land-waters freely to sea. The construction of these aqueducts is too well known to require further description here: probably, however, the little addition given to those erected on this occasion, may be found of some use. Observing it often happen, that, either from accident or design, the outward lid of the sea-sluices remained open, and admitted the tide to the great injury of the fresh waters within the marshes, I introduced here a light fly-lid within the centre of each sluice, which is out of reach, and yields to the slightest pressure of the water going out; but shuts closely against that of the tide, when it passes inwardly

inwardly the external flap. These sluices are laid upon as solid a foundation as can artificially be made on such soils, to prevent the crabs, and other sea-fish, from undermining them, which must otherwise be the case. The frame and flooring are of fir, which lies under water as durably as oak.

The land thus inclosed is partitioned into four nearly equal parts, by new out-ditches, twelve feet wide, five deep, and four at the bottom, which, with small intersecting rills from various parts, give the whole a good drainage of its salts, on the fall of heavy rains: and, by a course recently made from a distant brook, each division of this land is now amply supplied with fresh water. Not less than eight hundred South-Down sheep, and from sixty to eighty horses, are almost constantly grazed, and even winter thereon remarkably well. The establised opinion of the best farmers of the country, was, that land thus taken from the sea would

would not grow corn under thirty years at least after their inclosure. But as no experiment had been made, by which this fact could be clearly ascertained, as soon as I had shut out the sea from a part of it, about six yards square were immediately dug, and sown with horse-beans and oats, which, though the summer proved very dry, and consequently unfavourable, produced of each a fair return of sound, good corn; and the last harvest the same spot being sown with wheat, yielded an excellent crop. The next spring I mean to try it with barley and turnips. My first inclosed lands in this parish have produced two succeeding crops of fine oats, and are now growing a very promising breadth of rape for seed.

It may here be remarked, that the lower oozy parts of the new inclosure, on which no vegetable ever grew before, begin to be coated with various grasses; and as the saline parts die away in other

spots,

spots, for want of their natural moisture, fresh grasses replace them, so that the whole is now nearly covered with grazing plants of good quality, amongst which appear the different *clovers*, *trefoil*, and *rye-grass*, &c. Hence I conclude, but contrary to the general opinion, that though all these grew artificially from seed sown, it does not follow of necessity that they cannot be produced without. I think that the natural operation of the sun and air upon certain soils, will alone effect it; and my experience in lands taken from the sea, confirms very strongly this opinion.

I have the honour to be

Your most obedient servant,

HENRY BATE DUDLEY.

Bradwell Lodge,
December 17, 1799.

MR. TAYLOR.

THIS

THIS is to certify, that the Rev. Henry Bate Dudley, of Bradwell Lodge, in this county, has this year completed an embankment, with all the sluices and other necessary works appertaining thereto, within this parish, and has thereby effectually obtained two hundred and six acres of land from the sea, which he has subdivided, by twelve-feet ditches, into four spacious marshes.

J. H. WRIGHT,
Minister of Tillingham.

Tillingham, Oct. 1, 1799.

PAPER

IN

CHEMISTRY.

CHEMISTRY.

The GOLD MEDAL, or FIFTY GUINEAS, being the Premium offered for preparing the greatest quantity, not less than twenty pounds weight, of OPIUM, from POPPIES grown in Great-Britain, and equal in quality to the best foreign OPIUM, was this Session adjudged to Mr. THOMAS JONES, of Fish-Street-Hill, from whom the following Papers were received, and who made choice of the pecuniary Reward.

SIR,

IN the summer of 1794 I cultivated a considerable number of White Poppies (entitled in the New London Pharmacopœia, Papaver Somniferum, and, in another place, Papaver Hortense semine albo), when a few of the heads or capsules

having been broken off by the wind, I observed at the extremity of the stalks a substance in every respect resembling Turkey Opium. This accidental circumstance bringing to my recollection its method of production, as related in the Encyclopœdia and elsewhere, I wounded a considerable number of them with my penknife, and, in the course of the day, collected a small quantity of the abovementioned substance. As this circumstance took place while we were cutting lavender, it happened that an old and experienced servant, who was afterwards to distil it, was directing and assisting, and we agreed that it was probably in effect equal *to*, and was certainly more pure than any we had ever seen.

From this period I have never entirely lost sight of the object I am now to consider; but, on account of various avocations, and particularly my Rhubarb plantation, which at this time required all the attention I could well spare, it was not

not in my power to engage in an undertaking of such magnitude; and more especially on a scale so extensive as that which I had already determined to adopt, under a persuasion that experiments, when more confined, are for the most part fallacious.

As preparatory, however, I have not failed every year to repeat the operation, at once establishing its practicability, and availing myself of many advantages which can only be derived from observation and experience.

The inclosed Certificates will inform the Society that at length my plan has been carried into execution, but not with the degree of success that ought, and might have been expected to attend so large and expensive an experiment.

It must be confessed, that had I been at all aware what an almost Herculean labour I was about to encounter, I really suspect whether my resolution would have been equal to the task. Lest, how-

ever, this should discourage others from prosecuting this object, it is necessary to be more explicit.

Difficulties, and such indeed as are considerable, must necessarily attend most undertakings which have been hitherto unattempted; but the disappointments I sustained, though more numerous than generally fall to the share of a person under such circumstances, and more aggravated, did not all arise out of the undertaking itself, but from causes, some of which may be easily guarded against in future, while others may never again occur.

Two years have passed in producing what, I flatter myself, the Society will consider deserving their Premium, particularly if I am enabled to render the operation much more simple than may at first sight be supposed.

The claimant, I observe, is required to submit to the Society his particular method of cultivating the Poppies. As the

the mode adopted in the present instance arose rather from necessity than choice, I must go back as far as the autumn of 1797, to show how it happened.

Five acres of ground and upwards, situated in the parish of Enfield, in the county of Middlesex, I appropriated to this experiment, at the period above mentioned; which, being ploughed several times previous to the following March, were then sown broad-cast; and the weather proving favourable, the seed soon vegetated, and appearances were very promising. From the neglected state of the land, however, to which I was unfortunately a stranger, such a profusion of weeds sprang up among them, that, after many fruitless efforts at recovery, I was under the mortifying necessity of ploughing them all up together. This circumstance not taking place till the latter end of April, the season for resowing was elapsed; and as to cropping my field with oats or barley, a measure

very strongly recommended to me, I considered it as a deviation from my original purpose, and therefore, without paying any attention to it, gave the field a summer-fallowing, conceiving that Poppies might be sown with equal and perhaps greater advantage in autumn.

Finding that the broad-cast method of sowing precluded the possibility of hoeing where the land is much infested with weeds, I now adopted a different mode, and drilled in the seed with a very simple yet efficient machine, which I purchased of Mr. Macdougal, of Oxford-Street: but, as the weather began to be very severe so early as November, and continued so with few intermissions, the succeeding March found me very little forwarder. Yet still I persevered, and once more resolved to drill the whole five acres: they came up extremely well, and, as I expected, accompanied with innumerable weeds; but these by well-timed application were eradicated, though

though not without considerable difficulty.

I now thought myself secure; for nothing could assume a better appearance, till the beginning of May. Alas! I could not foresee the cold and remarkably dry weather that ensued, and prevailed, I believe, for six weeks successively. Hence the growth of some became stunted, and others were entirely destroyed; but happily some warm refreshing showers fell just time enough to rescue the remainder.

From these I have procured upwards of twenty-one pounds of Opium, five of which, in compliance with the Society's requisition, I have sent for their inspection and examination.

At one time I began to despair of even procuring this, comparatively speaking, small quantity, though it is not a fifth part of what I ought to have had, owing to the extraordinary rains and

winds which we experienced through the whole of the summer months.

This recital, as I have before observed, ought on no account to intimidate others from a co-operation; for it is obvious, that the former inconveniences originated in my own ignorance, whilst the latter depended upon causes that in all probability may never happen again.

Mr. Ball, in a letter published in one of the volumes of the Society's Transactions, advances an opinion which I consider as very fallacious, respecting the quality of land adapted to the growth of Poppies. He seems to be very little concerned about this point, and hints the probability of their being cultivated almost every where. I well know that Poppies, like many other vegetables, will grow in soils of every description; but of this I am fully assured, that, like the rest, they have their particular and favourite soil, viz. a sandy loam, and that the better this is, the more advantages

tages will accrue to the cultivator. For it should be considered, that, in bad, as well as good ground, the same expences of cultivation, scarification, and collecting, will be incurred, for perhaps a fourth share of the produce.

There is also another error in the same communication, which, having a tendency to mislead, ought to be pointed out. He tells us, to use his own words, "That, by a calculation he has made, supposing one Poppy growing in one square foot of earth, and producing only one grain of Opium, more than fifty pounds (I suppose he means, of course, apothecaries weight) will be collected from off one statute acre of land." Now, as there are no more than 43,560 square feet in an acre, and allowing one grain for each, the produce can be no more than ninety ounces and six drachms. This calculation appears to me to be as much in the extreme one way, as that of

Mr.

Mr. Ball is in the other. The medium is most probably nearest the truth; but upon this point I cannot at present speak with any degree of precision, on account of the scattered situation of my crop, and the extraordinary intemperance of the last season. Judging, however, from the number of heads we preserved, and comparing them with the total quantity, they seem to have yielded three-fourths of a grain each, upon an average, large and small.

I shall now lay before the Society some general remarks on the cultivation of Poppies, and then conclude with submitting a few hints and directions respecting the preparation of Opium.

Having a tap-root, their size will consequently be proportionate to the depth of earth they are enabled to penetrate. Hence the necessity of land that will admit of deep ploughing. The fineness of the surface too is very essential. As the

the seed is so small, and the plants, on their first coming up, so exceedingly tender, the bush-harrow should always be used after those which are commonly employed. By this mean a greater number are likely to vegetate, and their roots being better protected, are less liable to injury.

Poppies (and when I use this name, I mean that particular kind before specified) may be cultivated both by the drill and broad-cast mode of husbandry; at the same time it must be remembered, that the land for each requires a different disposition. In the former this is not so material, the sowing-machine regulating the distances of the rows according to the will of the operator: these ought to be nine inches or a foot asunder, and in beds containing four rows, allowing a foot and a half between each. But, with respect to the latter, this point must be strictly attended to: the ridges should never exceed four feet in breadth;

breadth; so that the furrows will answer the double purpose of preserving the land throughout the winter, and, in the season for collecting the Opium, serve as paths for the workmen.

Besides two chances of a crop, I am decidedly in favour of autumnal sowing; and the first week in September seems to be the most favourable period for this purpose. If the weather continues open, they will make such a progress as to be capable of resisting the severity of an inclement winter, without on the other hand being too forward; a circumstance highly dangerous, as the first severe frost is inevitably destructive.

On this account, whether by the drill or otherwise, a larger proportion of seed should be sown at this season, for the plants will defend each other; and as all the plants will not be equally forward, so, let the winter prove as it may, provided the seed has vegetated freely, there will be great probability of a good appear-

ance

ance in spring. If unfortunately, however, such a winter as the last should again occur, and the whole plantation fail, a circumstance which has happened to myself, the spring sowing ought not to be deferred longer than the first week in March.

I do not, without sufficient reason, recommend that this operation should be performed in autumn. The Poppies are not only generally larger, but even, when this is not the case, I know from experience, that they will yield a much larger proportion of Opium: for it seldom happens that a spring Poppy will bleed, as we term it, more than twice, while the others will bear scarifying till they are nearly ripe. This I imagine can only arise from the length of time the one has been in the ground in comparison with the other. Indeed, the difference is so striking, that if the present winter destroys my plants, I shall be almost tempted to dispose of my spring-sowing to other purposes.

purposes. In drilling, the necessity of covering the seed by harrowing is suspended by the operation of the machine; and, in the broad-cast method, a shower of rain will have all the effect without further trouble or expence.

Excepting great additional care, turnip and poppy hoeing are similar, and in every respect may be conducted in the same manner. I believe the turnips are rather benefited, they certainly are not injured by being shaken, and will recover from the effects of a wound; but if the Poppies are accidentally touched, they will either exhaust themselves by bleeding, or dwindle so as to be of no value. But it is high time to proceed to the last point I proposed to consider, namely, the production and preparation of Opium.

In ordinary seasons, the heads or capsules of the autumnal Poppies will be large enough for our purpose in the month of June; for at this time they will have attained about half their growth,

or

or be equal in size to a small tea-cup. I have invented a variety of instruments as scarificators; but as only two kinds were actually used, I am unwilling to trouble the Society with a description of any other.*

Seven, and sometimes eight boys, were employed from eight to twelve years of age, together with a man as a superintendant. The children's book, which accompanies the

* *Mr. Jones has since added the following Description of the Instruments, and their mode of application. They remain in the Society's Repository.*

The first of these instruments consists of two thin steel blades fixed by a wedge in a wooden handle, so as to make incisions about one fourth of an inch from each other.

The other is made entirely of steel, and resembles in form the tuning-fork of a harpsichord. It consists of four bars, proceeding from a handle of a convenient length, a quarter of an inch wide, and two and a half long, each terminating with a bolster, through which a screw passes that fixes the scarificators. The centre bars should be so elastic as to yield to the curvature of the capsule, upon the outer ones being pressed by the finger and thumb; and by this means four incisions are made at once, at equal distances. This instrument is an inch and three quarters in width; but, from the two outer blades, only an inch and a quarter. The bolsters are a quarter of an inch in diameter, and the scarificators a proportionate length, namely, three eighths. The wedge in the former, and a longitudinal aperture in the scarificators, or blades, of the latter, will regulate the depth of the incisions, at the will of the operator. It is of the utmost importance that these should not be made through the inner coat of the capsules.

the instruments, contains only an account of six, as the eldest, being the son of my gardener, is included in another book. To the youngest I gave three-pence per day, and, if tractable and well disposed, an additional penny for every additional year.

The steel instrument was used by the latter, and the others by the former. I have great reason to be satisfied with their construction; for, notwithstanding their simplicity, they proved themselves fully equal to my purpose; and so considerable a trial has not suggested any other improvement, than that in the largest the two inner bars only should be elastic; for the continual pressure of the finger and thumb on the two outer ones, which is absolutely necessary for the others to act, would be avoided, and consequently much fatigue and inconvenience prevented.

It is of very little consequence whether the first incisions are made horizontally or vertically, with this instrument; for

for however luxuriantly the milk may flow, by making four at one time, it so divides the stream that seldom any escapes. With the smaller ones we most commonly made them horizontally, beginning as near the top of the head as possible, and for this reason—all the juices, if the first incision was made at the bottom, would be naturally attracted by the aperture, and render every other completely fruitless, besides occasioning the certain loss of a considerable quantity, by falling on the surrounding leaves; whereas, on the other hand, a proportion of milk will exude from each, and the Opium be equally distributed over the whole surface of the head.

No particular directions seem necessary for repeating this operation, any farther than that each time it should be performed in a contrary direction, and continued till no more will exude, at intervals of four or five days or more, according to circumstances; for, as the

weather proves rainy or fair, they will be shorter or longer, the heads being sooner replenished in the one than the other.

Each of the children being provided with a tin cup, having one handle, so contrived as to fix itself to a girdle fastened round his waist, with a common gardening knife they scraped off the Opium that appeared upon the heads in a soft ash-coloured substance. Dewy mornings are best calculated for this purpose, and it should be discontinued so soon as the sun has gained a sufficient power to dissipate it; for, if persevered in throughout the day, some of the Opium will recede into the interstices, and more, in defiance of every endeavour, will remain upon the heads. The principal quantity exudes in the course of the night, and, uniting with the dew, it is taken off as readily and completely as with a sponge.

Several regulations were adopted to excite, as much as possible, a spirit of emulation. The name of each boy was written

written upon his cup, so as to ascertain, on their return from collecting, who had been the most active. And although, in consequence of the unsettled state of the weather, this part of our process continued so long as from the 6th of July to the second week in September inclusive, the good effects were felt to the last. And, as for the reason already mentioned, an hour in the morning became so invaluable, those who appeared in the ground at five o'clock, at the most busy period, became entitled to an additional penny to their daily pay. This measure succeeded at first only with a few; but the remainder, overcome by shame, at length attended equally well. In addition to this encouragement, I am under an engagement (in case I succeed with the Society), to such whose behaviour has been uniformly good, to celebrate the circumstance by a public dinner.

The interval from breakfast time to sun-set, if the weather assumed a set-

tled appearance, was occupied by scarifying. And here I again felt the good effects of stimulating measures: certain places were allotted to particular children, according to their ability, so as to discover who scarified the most and the best; the superintendant occasionally following all of them, to oberve whether any work was left unfinished, and, if there were any, to complete it. If, in our progress, any one proved refractory, which happened in more instances than one, rather than have recourse to severity, and for the sake of example, he was immediately discharged. I had numerous applications, and the first on the list always had the preference as his successor.

Upon the whole, considering it was the first attempt of the kind, every thing proceeded very regularly; and had the summer been propitious, notwithstanding my former disappointments, I should have had great cause for satisfaction.

The

The largest quantity that my man, seven children, and myself, were able to procure in one morning, from five to nine o'clock, was one pound and a half: this happened when the dew was remarkably great, and succeeded one of the warmest days in the summer.

From the experience I have had, the precariousness of our climate appears to me the only obstacle to the production of Opium in this kingdom. It may be said that the same inconvenience attends every other agricultural pursuit; and that hay, and a variety of productions, particularly hops, are much prejudiced from the same cause. I allow that they are so; but the evil produced by a sudden alteration in this case is irreparable; for, should it happen after a fine scarifying day, we do not only lose the labour of that day, but all its produce. It becomes obviously necessary, therefore, to be particularly circumspect; and this is the only remedy we are able to procure.

The Poppies will receive no damage from remaining entire, while, on the other hand, impatience may be injurious, if not destructive.

As my notes furnish me with no further particulars, I have very little more to add. The Opium, when first collected, from its union with the dew, is much too soft to be so formed as the Society will receive it.

To reduce it to a proper consistence, taking nature for our guide, it should be thinly spread in shallow dishes, and exposed, under glasses, to the rays of the sun. My opinion is, that Turkey Opium suffers considerably from the operation of fire; certain it is, that, with respect to its effluvia, it undergoes a complete alteration. I have covered it with its own leaves, thinking this a very convenient mode of package, and conceiving it to be important, in every new undertaking, by studying appearances, to yield to the general prejudices which naturally

naturally prevail in favour of the article to which we have been accustomed.

I have several times trespassed on the patience of the Society; on the present occasion I have again been seduced into prolixity. I hope they will receive the same apology now as before, knowing so well how acceptable every communication of this kind, though extended even to minuteness, is to the interested inquirer. To the utmost of my power I have complied with the requisition of the Society in Class 175, in describing the mode of cultivating the Poppies, and preparing my Opium; and, in doing this, I can truly say, that every thing which I have advanced is founded on the evidence of facts. I have been unwilling to indulge myself in mere speculation, being of opinion, that a paper of such a description as the present, would prove much more acceptable if confined to experiment alone.

Had it been necessary, I could have introduced a variety of quotations on this subject, describing the method of preparing Opium in other countries; but surely this would have been foreign to the subject. The information which the Society and the public require, is what really has and may be done, as related in this paper. This information does not consist of vague evidence, collected from accounts of doubtful veracity, and of course more calculated to mislead than instruct; on the contrary, I have closely adhered to what I conceived to be the principal intention of the Society; have related nothing but what I actually saw; have confined myself to a bare recital of circumstances; and have only occasionally ventured to make deductions.

I acknowledge, with heartfelt pleasure, the repeated honours with which the Society has distinguished me; and am not without hope, that this additional proof of perseverance and exertion will also

also receive its approbation. With the certificates, I have inclosed a very flattering letter from Dr. Woodville, author of the Medical Botany. It in a great measure proves, that if the practicability of preparing this inestimable medicine in this kingdom can be established, the Opium itself posseses every quality that can be desired.

I remain, SIR,

Your most obedient servant,

THOMAS JONES.

No. 3, Fish-Street-Hill.

Mr. TAYLOR.

SIR,

I CALLED yesterday morning to examine the Opium collected by you from the capsules of the White Poppy; and I have no doubt, from its taste, smell,

smell, colour, and purity, but that it is more powerful and efficacious than the best foreign Opium imported into this country.

The late Dr. Alston, when Professor of Botany and the Materia Medica in the University of Edinburgh, informed the public, more than sixty years ago (see Med. Essays, vol. V), that the milky juice, drawn by him from the heads of the White Poppy, soon acquired the consistence of Opium, when its taste, smell, faculties, &c. were the same as those of that drug.

In the year 1791 I convinced myself of the truth of his assertion, by repeating his experiments, which I noticed the following year in my Medical Botany. Soon after this time I appropriated a part of the garden at the Small-pox Hospital for the growth of the Papaver Somniferum, from the green capsules of which were collected between two and three ounces of Opium, which was found

to

to be more efficacious than that of the exotic, as appeared upon trials of it made by several of my medical friends. But the great trouble and length of time required for the collection of the juice, induced me at that time to think, that the manufacture of this valuable medicine in England, did not hold forth any prospect of commercial advantage. However, since I have seen the great quantity of it collected under your direction, I sincerely hope that the above opinion will prove to be unfounded, and congratulate you on your success.

Your obedient servant,

W. WOODVILLE.

Ely Place, February 25, 1800.

Mr. JONES.

SIR,

I BEG leave to acquaint you for the information of the Society instituted for the Encouragement of Arts, &c. that I have

I have this day ascertained the weight of a parcel of Opium, collected by Mr. Thomas Jones, of Fish-Street-Hill, from his plantation of Poppies at Enfield, and find that it amounts to twenty-one pounds seven ounces.

I conceive, from its pungent and bitter taste, that it is equal to the best Opium we receive from Turkey, with the advantage of its exceeding in purity any parcel of this drug I have ever seen imported from thence. I cannot but remark the ingenuity of the imitation of its form, which resembles many of the pieces we are accustomed to receive it in from the Levant.

I am, Sir,

Your most obedient servant,

John Horner.

Bucklersbury,
February 24, 1800.

Mr. Charles Taylor.

To

To the Society for the Encouragement of Arts, Manufactures, and Commerce.

I WILLIAM DUNCAN, of Philpot-lane, in the city of London, chemist and druggist, do hereby certify, that I have examined twenty-one pounds seven ounces of Opium, made by Mr. Thomas Jones, of Fish-Street-Hill, from Poppies grown on his plantation at Enfield; and I declare, that it appears to me to be as fine Opium as the best I have ever seen in the course of my experience, for upwards of thirty years: and I further declare, that the whole of the said twenty-one pounds seven ounces, is of equal quality with the five pounds sent herewith for the inspection of the said Society.

WILLIAM DUNCAN.

London,
February 25, 1800.

The

The Committee of the Society for the Encouragement of Arts, &c.

GENTLEMEN,

AGREEABLY to your request to the Physicians of St. George's Hospital, conveyed in a letter of the 5th of May last, I, as one of that body, return you the result of the trials made with the English Opium, in a few cases under my care.

1st. In a case of acute rheumatism, the effects of this drug in *sweating*, in *allaying anxiety*, in *abating pain*, and in *producing sleep*, were the same as from the same doses of foreign Opium, administered in a similar manner in like cases.

2dly. In a disease of the bowels, attended by pains in different parts, with sometimes diarrhœa, and at other times with constipation and distention, the English Opium *alleviated the pain*, and *restrained the evacuations*, as might have been

been expected from the foreign article.

3dly. In an instance of chronic rheumatism in one thigh, the English Opium produced *rest*, *warmth*, *perspiration*, *relief from pain*, and occasioned *costiveness*.

4thly. The English Opium aggravated the complaints in a case of hysteria, especially occasioning *sleeplessness*, *vertigo*, *sickness at the stomach*, and a *more frequent return of the paroxysms*; and similar effects ensued from foreign Opium.

If a larger quantity of the drug, whose virtues were to be determined by experience, had been sent, more trials would have been made; but I have no doubt that the same effects, and by at least as small a dose, would have been produced by it as by the best foreign Opium.

I have the honour to be,

GENTLEMEN,

Your most obedient servant,

G. PEARSON.

Leicester Square, June 4, 1800.

To

To the Committee of the Society for the Encouragement of Arts, &c.

GENTLEMEN,

AGREEABLY to your request, we have tried the Opium you were so good as to send to the Hospital, and am sorry, in the short time in which you desired an answer, that we have had only one case to give it a fair trial, namely, Elizabeth Spraughton, who has been several weeks under the care of Dr. Vaughan with a diseased state of stomach, and in whom we suspect a schirrus of that viscus. She has been in the habit of taking one grain of Opium every four or six hours, according to the violence of pain which she suffered. On the sixth of May she began with your English Opium, made into pills of one grain each, and found as much relief as she used to do from the foreign Opium.

She

She has continued taking them ever since, and with the same effect.

I remain, GENTLEMEN,

Your obedient humble servant,

G. E. LAWRENCE,
Apothecary.

Middlesex Hospital,
May 21, 1800.

THE Committee of Chemistry, to whose examination the English Opium, prepared by Mr. Jones, was referred by the Society, ordered samples of the Opium to be left with several eminent chemists for their analysis and judgment; in consequence of which, the following preparations were laid before the Committee by those Gentlemen, viz.

Extract of English Opium in proof spirit.

Hard Extract of English Opium.

Watery extract of English Opium of the late Dispensatory.

Tincture of English Opium of the present Pharmacopœia.

Tincture of English Opium of the late Dispensatory.

English Opium powdered.

Similar preparations of fine foreign Opium were produced in comparison.

From the general result of these experiments it appears, that Mr. Jones's English Opium is equal in quality to fine foreign Opium; and the certainty of its growth in this country, preparation, and efficacy, fairly established.

PAPERS

IN

MECHANICKS.

MECHANICKS.

The GOLD MEDAL, or ONE HUNDRED POUNDS, at the option of the Candidate, being the Premium offered for the Discovery of a Quarry of MILL-STONES, similar to the Stones known by the name of FRENCH BURRS, was this Session adjudged to Mrs. CATHARINE BOWES, and her CHILDREN, by her late Husband, Mr. RICHARD BOWES, of Conway, in North Wales, and who made choice of the pecuniary Reward. The following Accounts and Certificates were received relative to these Mill-stones.

SIR,

THE Rev. Mr. Hughes, of Kemel, has done me the honour of a call, and desired me to give you an account of the

Burr-Stone Quarry, and to send you specimens of the stone. A box of them, therefore, is sent to you by the mail of this day.

The quarry, which I hold from the liberality of J. Sneyd, Esq. of Belmont, in Staffordshire, is situated within the Corporation Liberties of Conway: the stone appears within a quarter of a mile of that town, and extends from east to west for the distance of two miles, appearing in most places upon the surface within that distance. Such an immense body of the stone has been left bare and exposed to view, that the industry of ages would scarcely lessen it. A deep chasm intervenes at the end of two miles; and, on examining the same line across this valley, I find the stone mixed up with various other fossil substances, to which it seems to bear no relation. In the next rise of mountains it resumes its quality, and takes a southerly direction,

passing

passing through a range of hills to the distance of two miles more, where the vein disappears. It is every where the highest stratum; and, when disengaged from the quarry where now worked, it tumbles down the side of the mountain to the plain within five hundred yards of the shipping-place, where small vessels may lie safely in all weathers at a natural quay, completely calculated for this business.

The quarry lies on the decline of a hill: the vein now is about eight yards wide; but we have reason to suppose it is wider below. At the depth we have sunk, which is at least twenty-five feet, the stone mends in quality. When first taken from the quarry it is much softer, and easier wrought into shape, than when exposed to the air; even a day makes a difference. The vein appears to me quite inexhaustible, and contains every variety of the stone, cellular, close,

hard, or soft. The right in this tract of country has been presented to me by Mr. Sneyd, under the hope that I might be able to make this discovery, and carry it vigorously into effect, in which he has not been disappointed. I came into possession on a Wednesday in August, 1797; I set hands to work the remainder of the day.—I had a quantity shipped on the Saturday—it arrived at Liverpool on the Sunday, and was under manufacture on the Monday morning. In order to entitle me to the Premium for the discovery and application of the Burr-stone Quarry, I inclose, for the inspection of the Society, several papers to certify the truth of my claim, and to show the progress I have made. There are two Papers from the hands of our Clergyman and Churchwardens, also from the Officers of the port of Conway, proving that I have carried the trade to a considerable extent: this has been done against

against the prejudices of a very confined neighbourhood, during the time I was unacquainted with their language, and entirely a stranger in the country. The money I have expended in this pursuit was the saving of a life of labour; and I have no resource but the Burr-stone quarry, and my own industry, for the maintenance of a wife and family. I have also a numerous working establishment depending upon me for support, which I have drawn together from different quarters.

When favoured with your Society's notice, it will prove to the kingdom at large the estimation in which this material is held, and assist to do away the prejudice attending all new pursuits.

A pair of mill-stones, four feet diameter, shall be laid down for the inspection of the Society in the Adelphi; and I will attend the Committee, to reply to any other

other inquiries they shall think proper to make.

I am, SIR,

Your obliged and obedient servant,

RICHARD BOWES.

Conway,
December, 1799.

To the Secretary of the Society for Encouragement of Arts, &c.

WE, the Minister and Churchwardens of the parish of Conway, do hereby certify, at the desire of Richard Bowes, that a Quarry of the material called Burr-stone, similar to that called French Mill-stone, has been opened in the Liberties of the Corporation of Conway, several cargoes of which have been shipped from this port, by the abovementioned Richard Bowes, at his own risk

risk and charge. A manufactory thereof is begun, and a number of workmen regularly employed; consequently the industry of the neighbourhood, and the general interest of agriculture, are promoted.

EDWARD OWEN, Vicar of Conway.

For self, and my Colleague in his absence,
ROWLAND JONES.

Conway,
December 5, 1799.

WE, who have hereunto set our names, do certify, that Richard Bowes has opened a Quarry of Stone within the Liberties of the Corporation of Conway, resembling the French Burr, used for grinding corn. Several cargoes of this stone have been shipped from hence for different parts, and a considerable quantity is at this time ready for shipping. A manufactory of this material

rial for making mill-stones has been opened here by the said Richard Bowes; and we are of opinion, with other persons who are competent judges in the milling business, that the said stones are a complete substitute for the French Burr, and that they will operate on grain equally.

WILLIAM ELLIS, per Co. Officer and Collector.

SAMUEL READ, Comptroller.

WILLIAM JONES, Tide-Surveyor.

Conway,
December 6, 1799.

WE, the Millers to Mr. Blundell, at Beverton-Bush Windmill, do hereby certify, and are willing, if required, to make oath, that we have worked the Welch or Conway Mill-stone, above four feet in diameter, upon wheat for several months past, in opposition to a French

French stone; and, it is our opinion, that it operates on the grain, and produces as good flour as the nature of the wheat wrought upon will admit, and approaches, both in texture and effect, nearer to the French Burrs than any we have ever known.

PETER CALAVAL.

WM. MYVING.

Witness,
SAMUEL LARIGO.

Liverpool,
December 20, 1799.

I HENRY GARDNER, millwright, and mill-stone manufacturer, do hereby certify, at the desire of Richard Bowes, that I have manufactured into Mill-stones about twenty tons of the Conway Burr-stone, for the purpose of grinding wheat; that five pairs, above four feet diameter, are composed of that

stone

stone only, three pair of which are in actual work; and the principal part of the remainder of the twenty tons has been intermixed with French Burrs in the manufacture of Mill-stone, it being my opinion that they are a good substitute for the French.

HENRY GARDNER.

Witness,
SAMUEL LARIGO.

Liverpool,
December 20, 1799.

SIR,

WE comply with your desire in noting the present situation of your cargo of Welsh Burr-stones, which, shortly after landing, we brought home to our own stores. The quantity is about forty tons; and we manufactured them into Mill-stones, with as much success as could be expected to attend a new

a new undertaking of the kind, particularly as we were not then acquainted with the best mode of making them up: of course, as the readiest method, we put the face of the burrs to the work, instead of the ends and edges; this mistake we have lately rectified, and find such stones as have been made on the improved plan, will answer as well as could be possibly wished. Indeed, from the reports of the millers at present working the three pair properly made, we have every reason to expect, that the importation of French Burrs will hereafter be discontinued, at least to this part of the kingdom. In the cargo we received one perfect Mill-stone, with the eye formed: it measures at present about five feet, and, when rounded for work, may measure about four feet ten inches, which is reckoned a large stone. We have not yet offered it for sale, as we wish to keep it as a sample of what your quarry can produce if properly encouraged, as nothing,

thing could show its superiority over the French more than this stone, which comprehends, in one body, at least the size of from twenty-five to thirty-three of the Burrs we usually receive from the French coast. We have nothing particular to add, but that we have within the last month procured three very expert hands, who have been used to this kind of work; of course we expect a few weeks will now complete a fresh quantity, as we have not, at present, a single stone remaining unsold of those made on the improved plan.

We remain respectfully,

Your most obedient servants,

EDWARD STEPHENS and Co.

Dublin,
December 26, 1799.

MR. RICHARD BOWES.

In

In addition to the above testimonials, the Society have received the following Certificates, viz. from Mr. Samuel Larigo, of Liverpool, stating the opinions of the working millers at that place, that, with proper selection in the combination of the Mill-stones, the Conway are a good substitute for the French Burr-stones; and that he had paid duty for fifty tons imported into the port of Liverpool.—From Mr. Robert Heakesly, of Liverpool, stating, that he had purchased a cargo of the Welsh Burrs, and had manufactured one pair of stones above four feet diameter; that he is of opinion that they are of the nature of the French Burr-stone, and a complete substitute for that article; that, from every information he could collect, the discovery is of considerable importance to the public in general, and to the agricultural interests of these kingdoms in particular.—From Mr. James Lund, Mill-stone Maker, and Mr. Joseph Tyrer,

Millwright, both of Liverpool, certifying, that they had seen and considered the nature and appearance of the Conway Burrs, and were of opinion, that they are a perfect representative of the French Burr-stone, and that, under such impression, they had purchased a quantity, and vested a sum of money therein for the purpose of manufacturing it into Millstones.—From Mr. Edward Doughty, of Bristol, stating, that he had received from Mr. Bowes a cargo of Conway Burrs, consisting of upwards of forty tons; that from his observation while under the tool, and from the texture of the Burr-stones, he was firmly of opinion they would answer the purpose of French Burrs; and that he had been a manufacturer of that article more than ten years.—From Sir Joseph Banks, noticing, that the certificates Mr. Bowes had produced to him were perfectly satisfactory, and had convinced him that the

the discovery was of considerable importance to the public.

Mr. Robert Ardlie, of the King's Mills, Rotherhithe, observed, in a note to the Society, that a pair of the Conway Burr-stones had been worked there ever since the month of August last; that on weak streams of water, and where they were not required to grind faster than at the rate of three or four bushels an hour, they would answer the purpose; but that he was doubtful whether they would be equal to good French Burrs.

Mr. Joseph Jackson, of the Tide-Mills, Liverpool, informed the Society that he had only tried a single mill-stone made from the Welsh Burrs, which was a bed-stone; that the stone which he worked upon it was a very fine French stone, and that they answered very well together.

The Committee, to whom the examination of the merits of Mr. Bowes's Mill-stones was referred by the Society, de-

sired the attendance of Mr. Fowles, of London-Bridge Water-works, and Mr. Norton, of Tooley-Street, Millwright: these gentlemen obligingly waited on the Committee, when Mr. Fowles gave it as his opinion, that if a proper person was appointed to the superintendance of the Conway Quarry, stones would be brought from thence fit to answer every purpose of the French Burrs; Mr. Norton was of the same opinion; and further observed, that he had occasionally purchased large quantities of Burr-stone from France; that the French Stones differ much in quality from each other; and that, in some parts of England, the preference was given to one kind, and in other parts to other kinds. Mr. Norton remarked, that wheat differs in hardness and texture, according to the soil on which it is produced; that the wheat of different districts, therefore, required stones of various degrees of hardness and texture to grind it; and

the

the Conway Quarry seemed likely to answer the purposes of the different counties, from the varieties of texture in the stone which it furnishes. He further noticed generally, that the millstones, formed from large pieces, are not usually so good as those made from small pieces of stone properly selected, large pieces being seldom uniform in quality. Mr. Middleton, of Lambeth, confirmed Mr. Norton's observations on wheat; he also produced specimens of French Burr-stones, which the Committee compared with the specimens of Conway Stone, from which, on examination, they did not appear essentially to differ.

A remark has already been made, that the Conway Stone becomes much harder by exposure for a length of time to the air. From external marks, it appears to be composed of quartz and cherts. It has been observed, that the Conway Stone has been manufactured into Millstones within a few days from the time

of its leaving the quarry; and that, even under this disadvantage, it has given satisfaction to the persons who have used it. It is not unreasonable to conclude, that, by allowing it to harden in the air for the time which intervenes from the separation of the French Burrs from their quarry, to their actual use in England, and forming the Conway Millstones upon the principle noticed in the letter received from Messrs. Stephens and Co. above quoted, they will supersede the use of French Burrs, and become a great national benefit.

It is much to be lamented that Mr. Richard Bowes died at Conway in March last, leaving a widow and two children, before he had acquired a fortune due to his unremitting attention, industry, and merit.

The Society has been lately informed, that Mrs. Bowes is at Conway, and that Mr. B. Chetney, of Newcastle, in Staffordshire, has the late Mr. Bowes's affairs in his hands.

The

The GOLD MEDAL, or FORTY GUINEAS, at the option of the Candidate, being the Premium offered for inventing a PARISH or FAMILY-MILL, was this Session adjudged to Mr. THOMAS RUSTALL, Wheelwright, of Purbrook-Heath, near Portsmouth, and who made choice of the pecuniary Reward.

THIS Mill promises to be of great public utility, as it can be constructed at a moderate expence, and stands on a small space of ground. It may be worked within a room in a farm-house, or even in a public kitchen, without occasioning much incumbrance.

Its peculiar excellence consists in this circumstance, that, from the vertical position of the stones, action may be given to it without the intervention of cogs or wheels: it may be used to grind malt, to bruise oats for horses, or to make flour, or for all these purposes; and it

can easily be altered to grind fine or coarse, as occasion may require.

It may be worked by one man; but if two persons are employed, it will furnish, in two hours, a sufficient quantity of flour to serve a family of six or eight persons for a week. The farmer, by allotting half an hour's time in the evening for its use, may make comparative experiments of the quality of his grain, and, at a trifling expence, provide himself with flour from his own wheat, without fear of sophistication, or being liable to the caprice or defrauds of a miller.

Repeated satisfactory experiments have been made with this Mill before Members of the Society; and the original Mill is now in their repository for the inspection of the public.

The following Certificate was received with the Mill:

THOMAS RUSTALL, of the parish of Farlington, in the county of Southampton, Wheelwright, having bestowed

stowed a great deal of time and expence in inventing and making a new Hand Corn-Mill, and having received two letters from Mr. More, the late Secretary of the Society, encouraging the same to be brought up and exhibited to the Society on the first Tuesday in February next:

We, the undersigned, do hereby certify, that we have seen the said Mill at work, which grinds the corn very well, and at the rate of one bushel of wheat within the hour, by the assistance of one man and a boy. The inventor is a poor man, with a large family, and we beg leave to recommend him to the Society's notice. Dated at Farlington, the 27th day of January, 1800.

G. Richards, Minister.
Geo. Plummer, Churchwarden.
James Moore, Inhabitant.

To the Society for the Encouragement of Arts, Manufactures, and Commerce, London.

Reference to the Plate of Mr. RUSTALL'S FAMILY-MILL. *(Plate I. Fig.* 1.)

A, the handle of the Mill.

B, one of the mill-stones, about thirty inches diameter, and five inches thick, moving with its axis C.

D, the other mill-stone, which is stationary when used, but may be placed nearer to, or further from, the moveable stone B, by means of three screws passing through the wood-block E, which supports one end of the axis C, after it has passed through a perforation in the centre of this bed-stone. Through this hole also the grain passes from the hopper F into the Mill.

F, the hopper, to which an agitation is given by two iron pins fixed on the axis C, which alternately raise this hopper containing the grain intended to be ground: the hopper sinks again by its own weight; the corn is delivered by this

this motion through a spout, passing from the said hopper into the centre of the Mill behind, and through the bed-stone D.

G, a paddle which regulates the quantity of corn to be delivered into the Mill; a greater or less quantity of which may be furnished, by raising or lowering the paddle.

H, the receptacle for the flour, into which it falls from the mill-stones when ground.

The bed-stone D rests upon two supporters of wood, one of which is shewn at I: these supporters are screwed to the block E, and also morticed into the lower frame-work of the mill at K: the frame-work is held together by pins or wedges L L L, which admit the Mill to be easily taken to pieces.

M, a fly-wheel placed at the furthest extremity of the axis C. On this fly-wheel another handle may be fixed occasionally.

N,

N, a small rail which preserves the hopper in its place; the furthest part of the hopper rests on a small pin, which admits sufficient motion for the hopper to shake forward the corn.

O, a spur-rail, to strengthen the frame-work of the Mill.

P, the front upright, which is morticed into the frame-work of the Mill; this is a rest for that end of the iron axis C which is next the handle. There is a shoulder on each end of the axis, to keep it steady in its place.

N. B. A cloth-hood fixed to a broad wood hoop, is placed over the stones whilst at work, to prevent the fine particles of flour from flying off.

Account of Mr. Rustall's Bolter.

A bolter or sifter to separate the flour from the bran, being necessary to use along with the Mill above described,

Mr.

Mr. Tho.s Rustall's Family Mill, and Bolter.

Fig. 1.

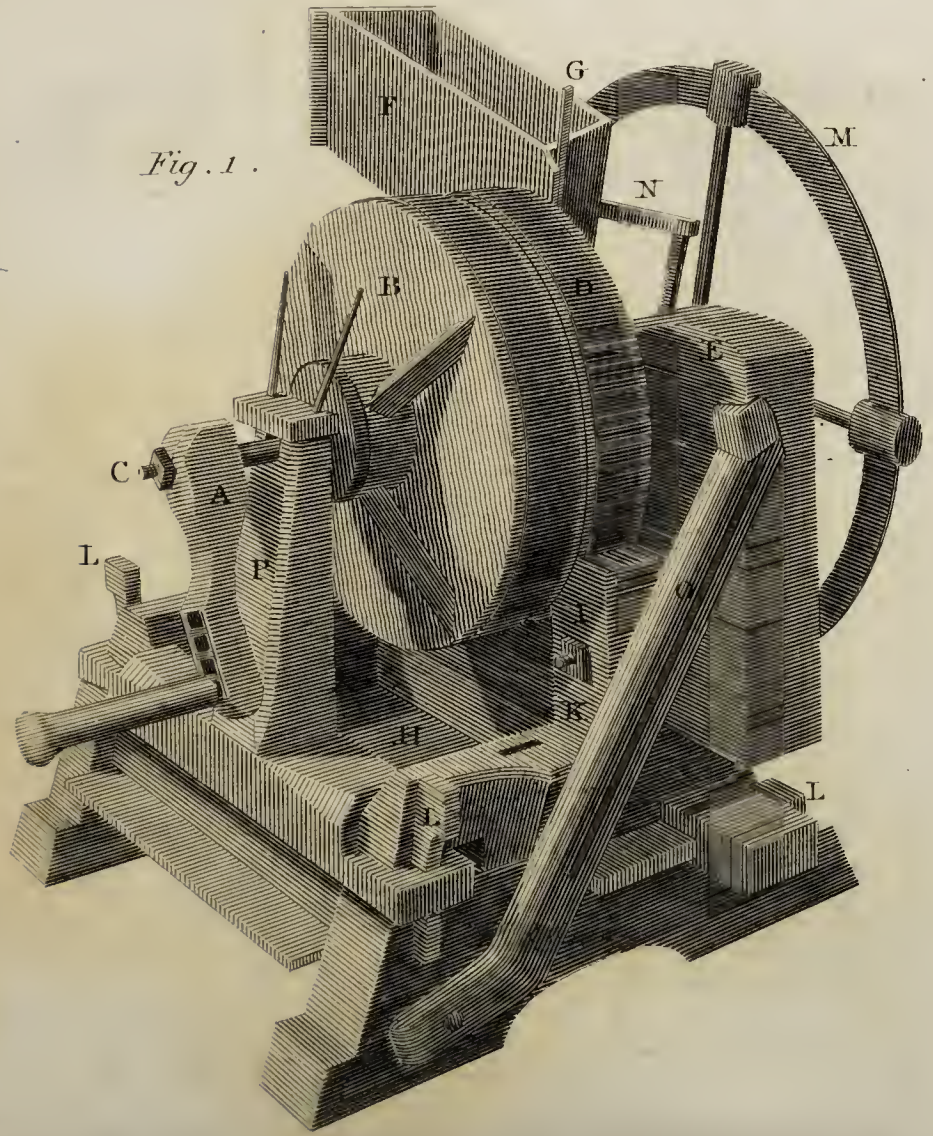


Fig. 3.

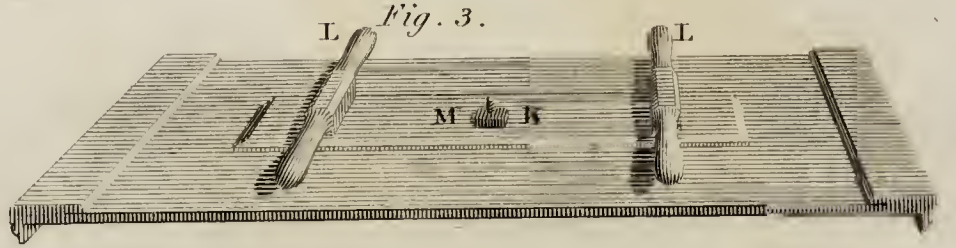


Fig. 2.

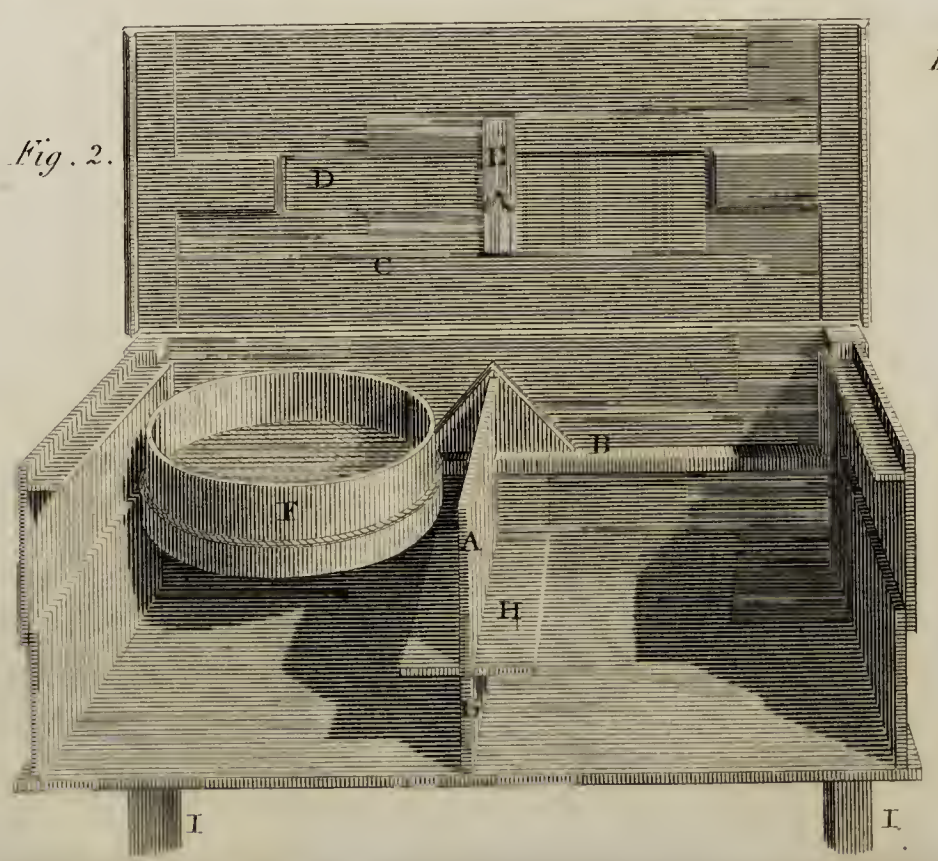


Fig. 4.

Drawn & Engraved by Lowry.

Mr. Rustall furnished the Society with one made upon a very useful and simple construction, which is also placed for inspection in their repository. This machine is applicable to other purposes; and as its being generally known may prevent many inconveniences which attend the levigation of noxious articles, and a waste of their finer particles, an engraving and description of this Bolter is annexed for the benefit of the Public.

Plate I. Fig. 2. represents the bolter, the front of which is removed, to show its interior construction; its length is 3 feet 10 inches, its breadth 19½ inches, its depth 18 inches.

A, is a moveable partition, which slides about four inches backwards or forwards from the centre of the box, upon two ribs of wood, fixed to the back and front of the box, one of which ribs is shown at B.

C, the lid of the bolter represented open.

D,

D, a slider moveable in a groove in the lid by two handles on the back of the lid.

E, a forked iron fixed in the slider D: this fork, when the lid is shut, takes hold of the edge of the sieve F, and moves it backwards and forwards on the ribs of wood B, as the slider is agitated.

G, a fixed partition in the lower part of the centre of the box, to separate it into two equal parts, in order to divide the fine and coarse flour; the slider A moves about four inches each way from this partition, and thereby gives room for the sieve F to be worked.

H, a board parallel to the bottom of the bolter, and forming part of the slider A. The use of this board is to prevent any of the sifted matter from falling into the other division.

I, represents two of the back-feet on which the bolter stands.

Plate

Plate I. Fig. 3. shows the top or upper part of the lid of the bolter.

K, the slider which moves the length-way of the bolter.

L L, handles which work the slider.

M, a screw holding the fork which gives motion to the sieve.

Plate I. Fig. 4. the forked iron shown separate from the lid.

A Bounty of FIFTEEN GUINEAS was this Session voted to Mr. S. HOLMES, Smith, of Castle-Court, in the Strand, for an OVEN, of his invention, heated without Flues, of which a description and print are here given, and which Oven is reserved by the Society, for the inspection of the Public.

SIR,

I TAKE the liberty of presenting, for the approbation of the Society, an Oven upon a new plan, which I call a Conducting Oven. The Ovens in general use are made with flues, which destroy a great quantity of fire in its passage through them, and much trouble is required to keep them heated. The fire which should be employed in roasting meat, is in a great measure dissipated in the flue of the common Ovens, if used

at

at the time of roasting, or the common oven does not require sufficient heat to answer the purpose, unless much coal is consumed.

My invention consists of a cast-iron Oven, with a solid piece of iron projecting from its side into the fire, in which this piece constantly remains, and becoming red hot, communicates sufficient heat for baking to the whole Oven, and even assists the fire in roasting.

My Oven keeps continually at a baking-heat, without expence or trouble, as the common fire is sufficient for the purpose. The first Oven, which I made for experiment, was fixed in my own house, for use, eighteen months ago, and may be viewed at any time the Society think proper. Others are also in use at Mr. Blackmore's, in Brompton; Mr. Esdale's, the Banker, in Clapham; Mr. Robinson's, at Kensington; Mr. Roe's, at Battersea; and the Rev. Mr. Wise's, at Carlwood; all of which have even exceeded my expectations.

I have no doubt, if you think it necessary, that those gentlemen will give me certificates of their utility.

I should desire you would excuse my giving you this trouble; but as I know the liberality of the Society, where any improvement is made that may be of advantage to the public, I am emboldened to lay this invention before you, requesting such reward as it may be thought to deserve.

I am, SIR,

Your most obedient Servant,

S. HOLMES, Smith.

Castle-Court, Strand,
April 2, 1800.

Mr. CHARLES TAYLOR.

Mr.

MR. HOLMES has put up one of his new-constructed Ovens at Mr. Roe's school, in Battersea, which answers the purpose exceedingly well.

THOMAS ROE.

No. 58, *Strand.*

I DO hereby certify, That Mr. Samuel Holmes, smith, of Castle-Court, has put up in my house an Oven upon his new construction, with a knob on the side; which Oven answers every purpose for which it was intended, and bakes equally well with a baker's oven.

EDWARD BLACKMORE.

Old Brompton,
April 17, 1800.

Mr. HOLMES,

THE Oven you have put up for me answers the purpose well; and should it lie in my way to recommend you, I shall feel a pleasure.

Yours truly,

J. NIXON.

No. 2, *Little Britain,*
April 10, 1800.

Mr. Holmes,

IN answer to your application for my testimony respecting the Oven you applied to the side of my kitchen-range, I am happy to say, that in point of heat, it has answered full as well as the iron ovens heated by separate fires.

I am, Sir,

Your humble Servant,

Samuel Saxon.

Cannon-Row.

IN order to ascertain fully how the Oven answered, a Committee, appointed by the Society, ordered, on the 17th of April last, two Ovens, of similar forms and dimensions, to be fixed to the sides of a fire grate, in the model-room of the Society, one of which ovens only differed from the other by the piece of cast-iron projecting from its side into the

the fire: both ovens were heated by the same fire, and fixed in mortar and brick work in a similar manner.

Two loaves, of equal size and quality, being prepared from the same dough, one was put into each oven; and after remaining therein three quarters of an hour, they were taken out at the same time, and examined. The loaf from Mr. Holmes's oven was in every respect well baked, but the other was dough-baked and imperfect. An Oven upon Mr. Holmes's construction has been fince fitted up in the Register's kitchen, which appears to answer every purpose that could be expected from its size, which is $13\frac{1}{2}$ inches wide at the door, or in front, and 15 inches deep.

A reference to *Plate II. Fig.* 1 and 2, will explain more fully the construction of the Oven, and its principle of action.

Fig. 1. A perspective view of the Oven.

2. A horizontal section of the same.

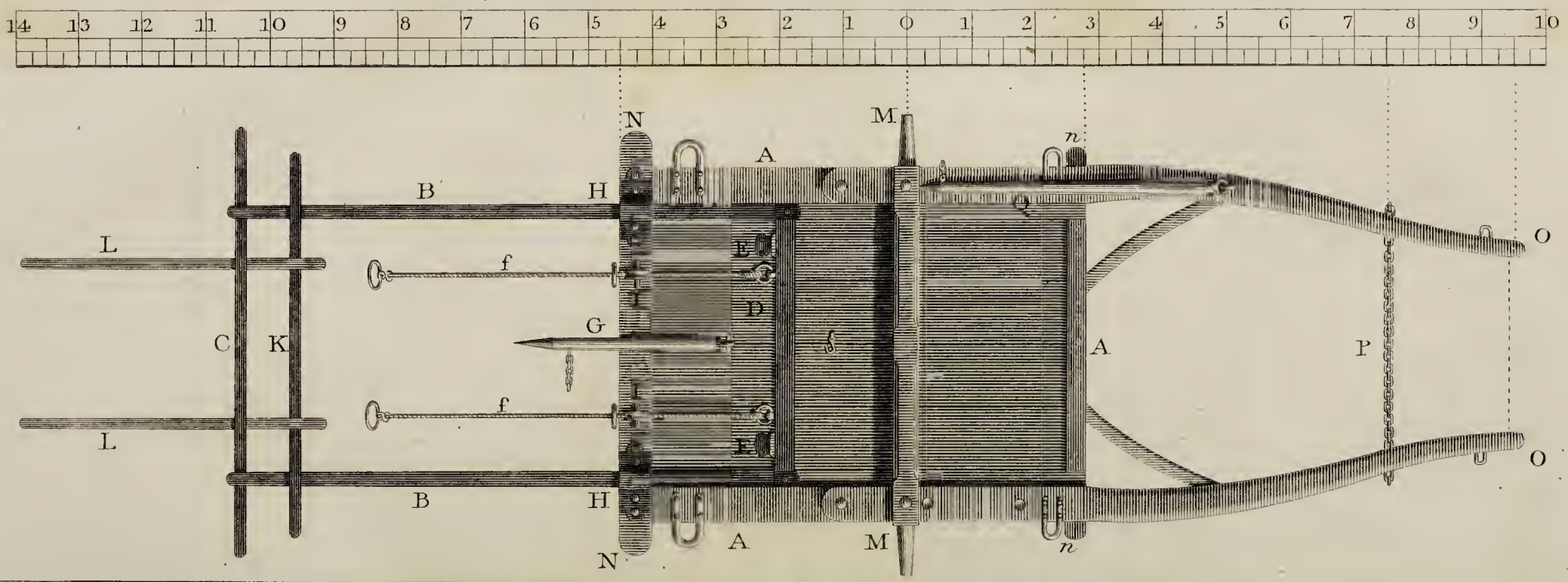
A. That side of the Oven which is placed next the fire.

B. The projecting piece of iron which remains stationary in the fire, and communicates heat to the Oven.

C. The door of the Oven.

The

Mr. J. Smart's Sliding Lever for Relief of Horses.



Mr. I. Holmes's Family Oven!

Fig 1

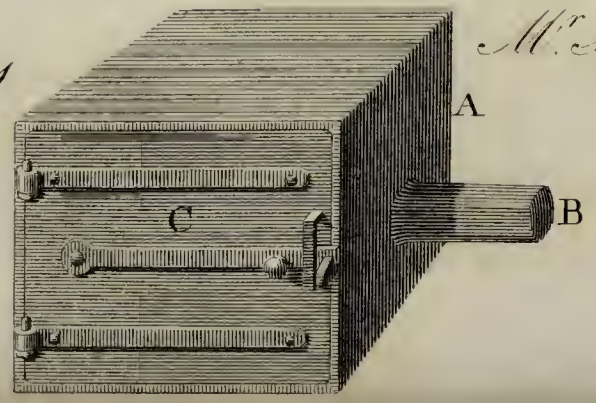
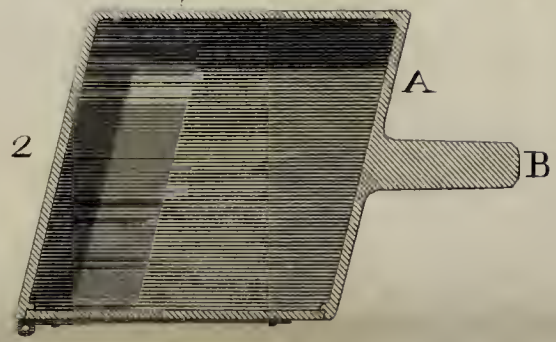


Fig 2



Lowry sculp.

The Thanks of the Society were this Session voted to Mr. JOHN SNART, No. 209, Tooley-Street, London, for the following Account and Drawing of a SLIDING LEVER fixed to the under side of a Cart, for the relief of Horses when thrown down and entangled in the Thills. The Society wish, for the sake of humanity, to alleviate the cruelties to which horses are subjected, and hope the plan here given will afford a useful hint for further improvements in this line. This Machinery will also afford some advantages in loading carts, where the common length of the cart is too short for the articles intended to be carried.

DESCRIPTION *of the* SLIDING LEVER *invented by Mr.* JOHN SNART, *Optician, London, for the improvement of Carts, and relief of Horses, and which may be applied to all two-wheel Carriages. This invention he calls an* ALEXIPPOS. (See Plate II.)

A A A, plan of a common town cart inverted.

B B, Sliding bars or levers, *i. e.* the Alexippos.

C, Cross-bar, or handle of the Alexippos.

D, the connecting bar to project the Alexippos.

E E, stops, to prevent over-drawing ditto.

f f, ropes and hand-rings to project ditto, which may be put under the sliding bars B B.

G, prop to prevent hanging the horse.

H H, the bearing plates of the Alexippos.

I I, the pulleys, or shivers.

K,

K, the extra bar for country carts.
L L, the handspikes for ditto.
M M, the axle-tree, or fulcrum.
N N n n, hind and fore ear-breadths.
O O, the extremities of the shafts.
P, the back chain.
Q, the prop.

SIR,

AS all librating bodies act in an exact and direct ratio to their elongations from the fulcra, considered in connexion with their proportion of weight, and *vice versâ*, (the first resistance by the inequality of their matter being excepted), it appears, that as is the solidity of the part resting on the fulcrum, to the solidity of its extremities, so is its resistance to be acted upon by a weight which is less than its disproportion; which inequality of power is to the weight added in an inverse ratio, but directly as the diminution.

It

It is evident that the construction of carts at present is very unfavourable to the relief of the fallen horse, who is intentionally placed at the longest arm of the lever (for the shafts act as a lever by supposing the axle-tree to be the quiescent fulcrum), that he may the better resist the weight of the load, should the equilibrium be by any means destroyed; for any given weight upon the hind part of the cart has less than half the power of resistance of the horse; so that, if such horse falls, this advantage is prejudicial to his being raised. The inventor, therefore, of the Alexippos, presumes that a plan, the basis of which is humanity, will sufficiently apologize for his offering to the public an invention which so obviously more than counteracts the before-mentioned disadvantages, as may be seen by inspecting the plan in connexion with its scale.

Let A A A *(Fig. I.)* be a plan of the common town cart, whose hind ear-

bred,

bred, or ear-breadth, N N, projects from its fulcrum, or axle-tree, M M, 4 feet 7 inches, while the back chain P is 7 feet 6 inches; and the extremes of the shafts, O O, which press upon the tuggs in the horses collar, are 9 feet 6 inches. Now, admitting that the horse who falls weighs 15 cwt. and that his bearing is 1 cwt. which is 16 cwt. it is very evident that it will require 3316 lb. weight gross at the ear-breadth N N, (which is but 4 feet 7 inches from the fulcrum M M), to counteract such a weight; even admitting that the load had not slipped forward at all by the concussion and depression of the fore parts of the cart. The estimate, therefore, now will be nearly as follows: 4 feet 7 inches, or 55 inches, to 9 feet 6 inches, or 114 inches, will give for the weight 3316 lb. which is more than that of twenty-two men, at 150 lb. weight each, before a disabled horse can be raised from the ground: but we know that six men cannot bear

their

their weight with advantage on one of our present-made carts, without endangering their persons or clothes, or both; so that the horse is left to struggle with three-fourths of the weight himself, and this in a very bad posture, as he is embarrassed by the shafts, &c. Hence, many horses, if not immediately killed, are at least ruined for ever.

The advantage of the Alexippos is in the proportion of 126 inches, the length of the levers at C, to 114 inches, the length of the shaft, viz. O O; and this without the addition of the handspikes L L, which gives a further advantage of one-fourth. Again, if 55 inches, the length of the lever, at N N, require 3316 $\frac{20}{35}$ lb. weight, what will 126 inches require? Answer, 1447 $\frac{58}{126}$ lb. which is less than the weight of ten men, at 150 lb. weight each. This, however, is not half the advantage of the Alexippos, as it affords convenient accommodation for more than twenty men, without hazard

to

to clothes or persons. And, if we suppose a sliding bar at K, one man, (if men are scarce, as in the country) by applying the two handspikes L L, may gain power sufficient to raise his horse himself, especially as it fortunately happens that country luggage very frequently consists of such articles as might be removed from the front of the cart, and placed on the bars C and K; such, for instance, as sacks of corn, seed, potatoes, bran, flour, peas, beans, &c. &c. which, by being taken from the front, and placed behind, would have more than double the advantage of its real weight; and, in town, where the luggage is different, assistance is always to be obtained from humanity.

Notwithstanding the statement of powers for relief which I have here given, it is plain, from daily observation, that less than half the power here stated is only used in general, as eight or nine men can often (though with much danger

ger and trouble) raise the fallen horse. Hence, by using the Alexippos, three or four men, without danger, delay, or trouble, will be sufficient.

I remain, SIR,

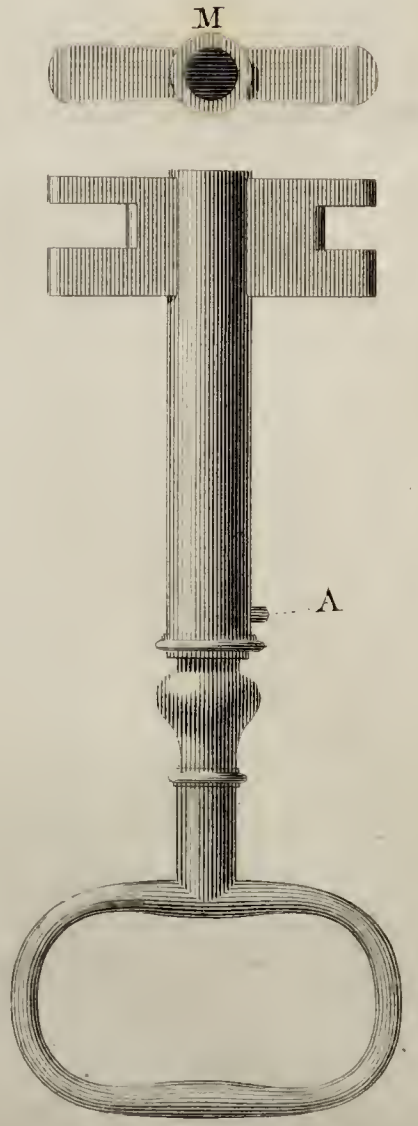
Your obedient servant,

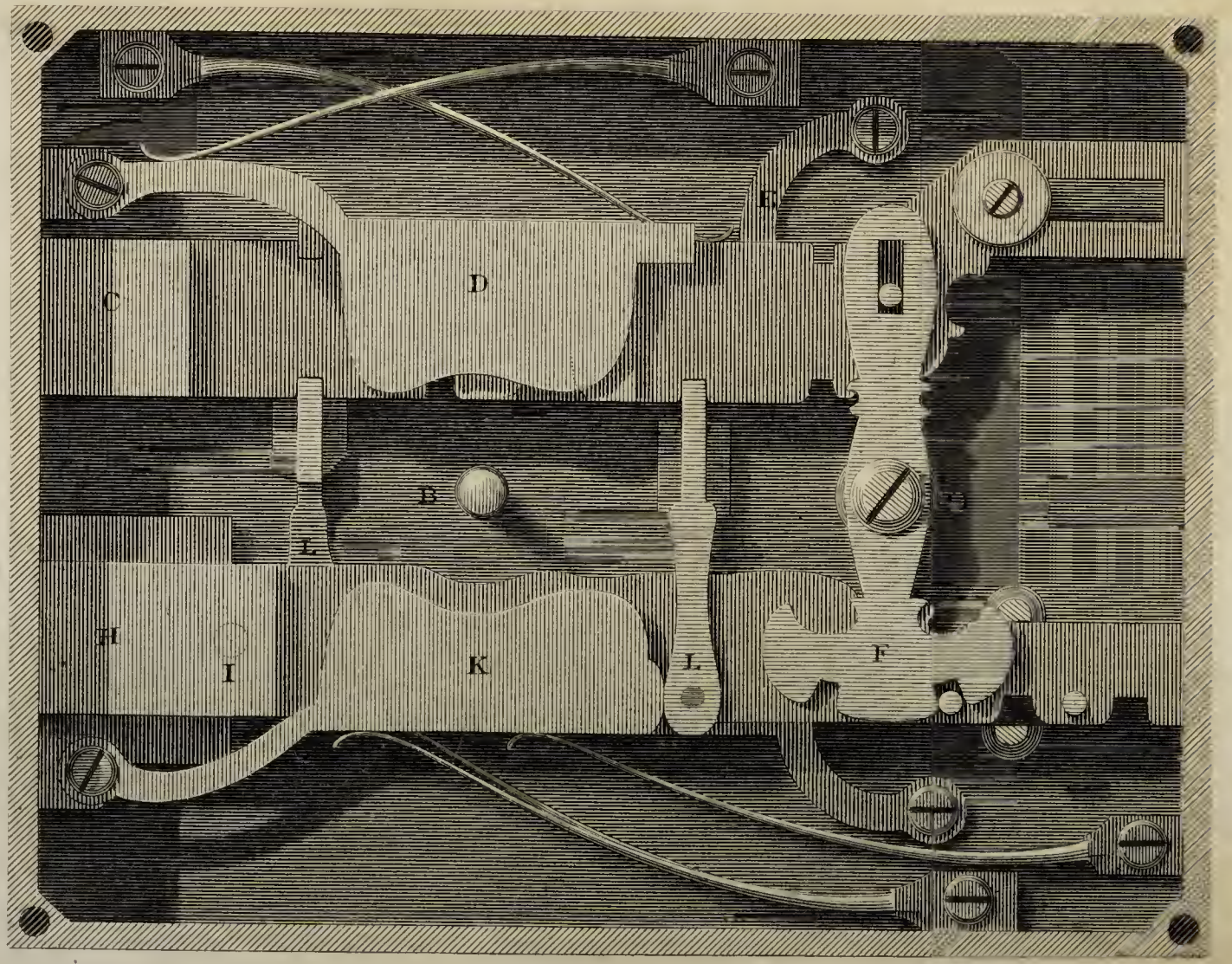
JOHN SNART.

July, 1799.

To the SECRETARY.

Mr. Tho.s Arkwright's Door Lock.





Matilda Lowry del.

Lowry sculp.

A Bounty of FIFTEEN GUINEAS was this Session voted to Mr. THOMAS ARKWRIGHT, of Chorley-Moor, in Lancashire, for a DOOR or CHEST LOCK, of a peculiar construction, for securing Property from PICKLOCKS and HOUSEBREAKERS. This Lock has two Bolts so formed, that if the Key should by accident be left in the Lock, it would be scarcely probable that a Servant could unlock them. A Description and Print of the Lock are annexed; and the Lock itself is reserved in the Society's Repository, for the inspection of the Public.

DESCRIPTION of Mr. ARKWRIGHT'S LOCK, PLATE III.

A. THE pointer on the shank of the key.

B. The pin on which the key turns.

C. The

C. The top-bolt of the lock.

D. The upper higher tumbler for the top bolt.

E. Another tumbler for the top-bolt, and placed underneath it.

F. A lever which works both bolts, and moves on a centre G.

H. The lower bolt, with a joint I upon its head.

K. The lower tumbler, with two joints LL, which fall into two notches of the top-bolt. Underneath the lower-bolt is another tumbler similar to that marked E.—There are five springs within the lock, four of which act upon the upper and lower tumblers, the other on the joint-bolt H.

M. The bottom part of the key. The dark ring in the centre represents the hollow to be applied to the lock pin B, above mentioned.

DIRECTIONS *for working the* DOUBLE-BOLTED LOCK, *invented by* MR. THOMAS ARKWRIGHT, *of Chorley, in the County Palatine of Lancaster.*

FIRST, place the head or bolts of the Lock towards the left-hand; then take the key with the right-hand, with the small pointer A, in the shank of the key towards the right: after this, put the key down to the bottom of the socket upon the centre-pin B, in the lock, and give one half-turn with the pointer, in the shank of the key, upwards; by which the bolt C at the top will be locked. In the next place, draw back the key about one inch, so that the webs or bits of the key may clear the tumblers in the lock; then turn the key with the small pointer towards the right hand, and put down the key in the manner above mentioned. After this, make one half-turn with the pointer in the

shank of the key downwards, by which mean the lower bolt H is locked, and the higher bolt C unlocked. Then draw up the key as aforesaid, and turn it with the pointer in the shank to the right hand. In the last place, thrust down the key, and give one half-turn with the pointer, in the shank of the key, upwards, by which mean both the bolts, C and H, will be locked; so that, when the bolts are to be unlocked, the pointer in the key must be towards the left hand, and must be worked as above directed.

A Bounty

A Bounty of TEN GUINEAS was this Session voted to Mr. WILLIAM BULLOCK, No. 6, Portland-Street, Soho, for a LEVER LOCK-BOLT for FOLDING-DOORS, by means of which the upper and lower Bolts are withdrawn with ease by the turn of a common Door-handle, and the same Bolts shot and fastened merely by pressing the Door to its proper place. The following Letter was received from him, and an elegant Model of this Invention is left in the Repository of the Society.

SIR,

I SEND with this, for the inspection of your Society, the working part of a Rack or Lever-bolt, which prevents the bolts from becoming stiff by rust.

From the benevolence of the Society to me in 1797, for my Reliever for a

Rack-bolt, I was induced to make further trials to bring it to perfection.

I believe the method now produced will answer every purpose that can be desired, as it works very easy; is not liable to want repair, nor to be much, if any, injured by rust. I have lately made, and tried several, which answer very well, which induces me to lay this method before the Society, as an improvement in the machinery of a Rack-bolt, or, more properly, of a Lever-bolt.

I remain with respect, SIR,

Your humble Servant,

WILLIAM BULLOCK.

No. 6, *Portland-Street, Soho,*
March 25, 1800.

MR. TAYLOR.

DESCRIPTION

Description of Mr. William Bullock's Lever Lock-Bolt.

THE handle, in external appearance, resembles the round door-handles in general use; when moved, it acts in a double chain fallow: the lower chain communicates with a lever which has a pivot near its centre, the extremity of which lever raises up the lower bolt of the door when shut; the upper chain communicates with another lever connected with the upper bolt, which it draws down by moving on a pivot near the centre of the lever; and thus the bolts are opened. The upper bolt being stopped down by a reliever at the top of the door, the bolts are prevented from grating either at the top or bottom of the door. On shutting the door, the reliever is pressed in by the wood-work at the top of the door, which sets the bolts at liberty; the lower bolt then falls down,

and the upper bolt is propelled by two springs which act upon the upper and lower levers, and the door remains firmly bolted.

A great advantage arises in the use of this invention, from the whole of the machinery acting upon pivots, which are not liable to rust, but allow a regular and easy motion to the bolts.

The

Mr. Geo. Davis's Method of Security to Coach Passengers.

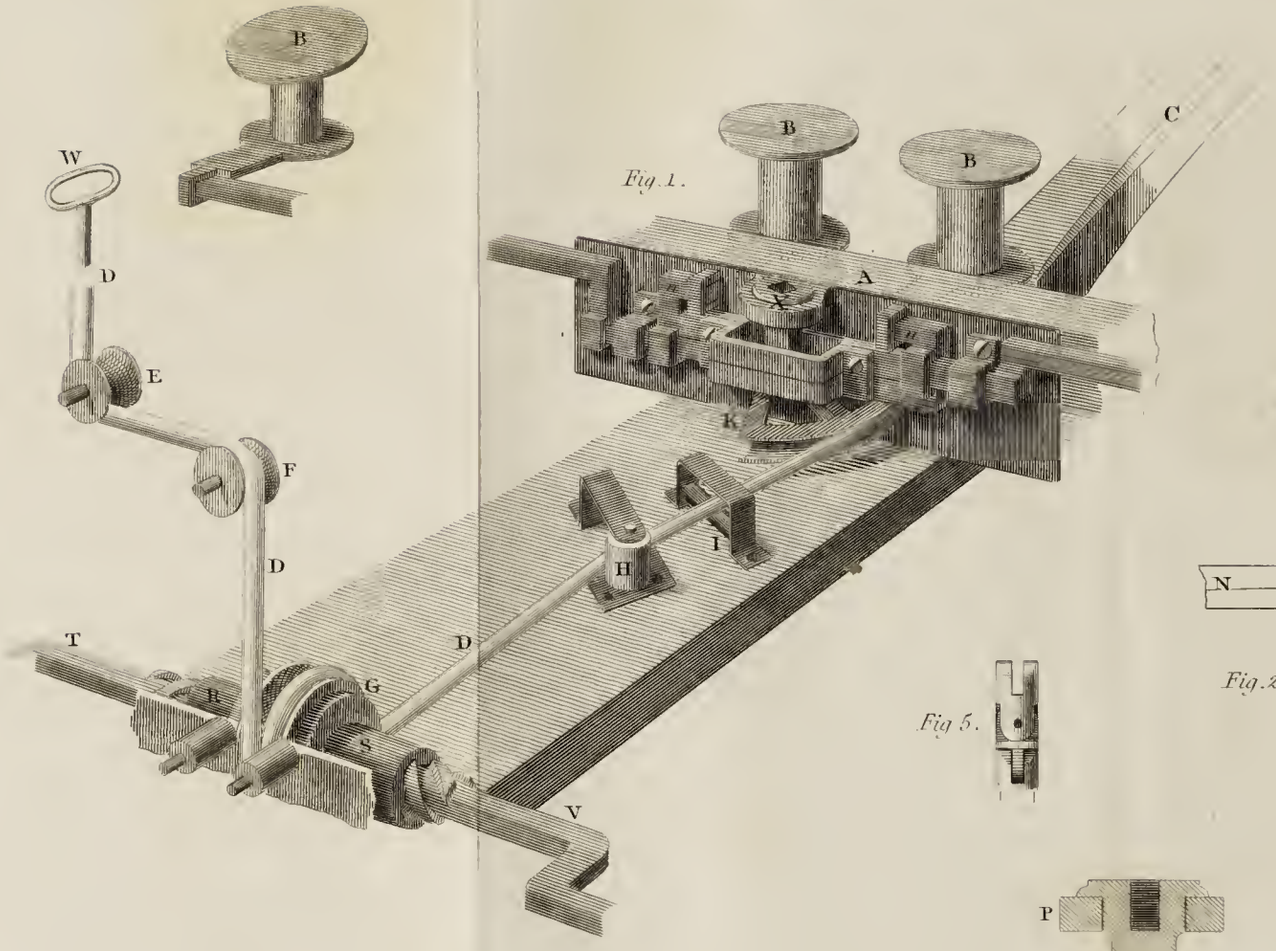


Fig. 1.

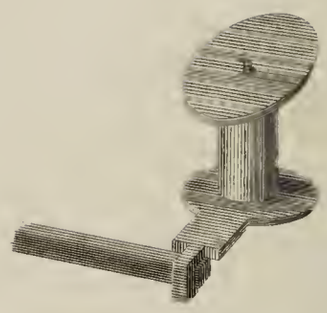


Fig 5.

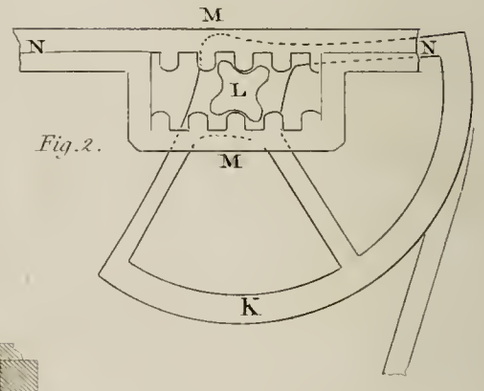


Fig. 2.

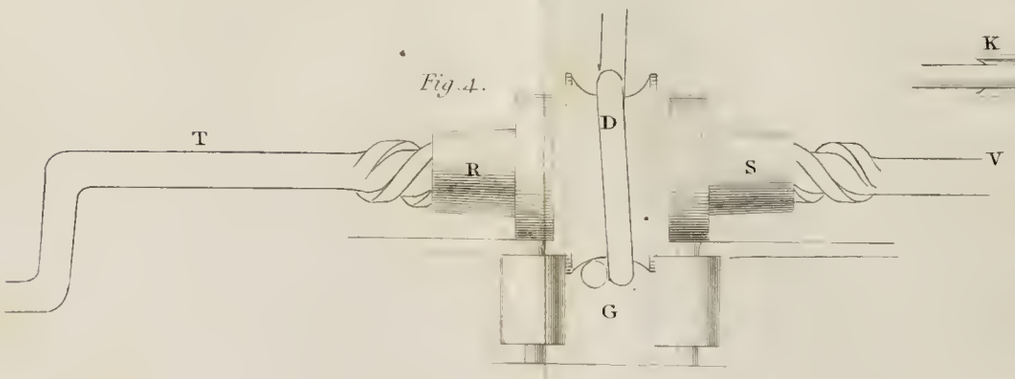


Fig. 4.

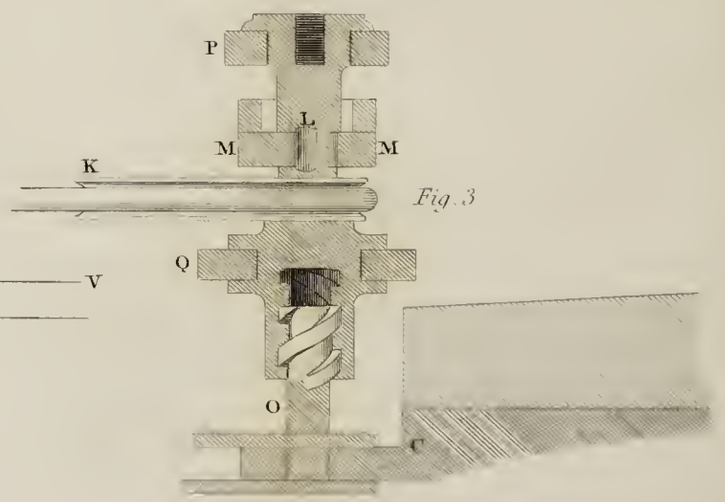


Fig. 3

Lowry del. et sculp.

The GOLD MEDAL, or THIRTY GUINEAS, at the option of the Candidate, was this Session adjudged to Mr. GEORGE DAVIS, as a Bounty for his Invention for preventing Passengers in Carriages being injured when the Horses have taken fright; from whom the following Account and Certificate were received, and who made choice of the pecuniary Reward. A Model of this Machine may be seen in the Repository of the Society.

SIR,

I HAD the honour some months ago of giving in a claim for the Premium offered by the Society to any person who should invent a method of "Extricating Horses from a Carriage, to prevent Passengers from being injured;" but not having *then* brought it to that

perfection I could have wished, I informed the late worthy Secretary, Mr. More, that I should withdraw the claim for that Session. It is now completed, and ready for any inspection or trial before mechanical men, that the Society may judge expedient; and I therefore renew my application for the Premium.

Having affixed the apparatus to a coach, I should conceive it would not be necessary to enter into a very particular description of it. I shall therefore only relate the manner of operation.

" It is fixed behind the splinter-bar, and the communication, by means of a copper chain, is carried through the boot to the side of the coach-box, that, in case of the horses taking fright, or, of that more fatal accident, the reins breaking, which precludes the possibility of stopping the horses, the coachman can discharge them instantaneously." There is this superiority in my invention, over any other method hitherto put in practice,

tice, "That the horses can be liberated, even when the pole is at right angles, or locked close to the perch, a position which otherwise overturns a carriage." I have had the honour of exhibiting a trial before His Majesty, and discharged the horses three times; which Mr. Vidler, of Millbank, can attest, having been present on the spot, and who was pleased to say, that he thought, if it was more generally known, no carriage would be without it.

I am, SIR,

Your obedient humble servant,

The CANDIDATE.

Nov. 13, 1799.

To the Secretary of the
Society of Arts, &c.

SIR,

SIR,

BEING informed that Mr. George Davis, of Windsor, has put in a claim for the Premium offered by the Society for releasing four horses from a carriage when in full speed, I have the pleasure of informing you, that I saw it performed three times before His Majesty in Windsor Great-Park, on the fourth day of March, 1799; when it fully answered every purpose for which it was intended; and, in my humble opinion, may be applied to carriages in general, and does much credit to the inventor as a mechanic.

I am, SIR,

Your humble servant,

J. VIDLER.

Millbank Factory,
Millbank-Row, Westminster.

To the Secretary of the
Society of Arts, &c.

The

THE Committee of Mechanicks, to whose consideration this business was referred by the Society, appointed a trial to be made near the Magazine in Hyde-Park, on Thursday the twenty-seventh of March, 1800, with a coach, to which the apparatus was attached. Four horses and two postillions were employed for the purpose. A person sitting on the coach-box loosed the pole and rollers from the carriage, by pulling a chain placed near the boot, which chain drew back the bolts in the splinter-bar, and allowed the pole and rollers to be carried off by the horses, at a time when they were galloping at the rate of more than ten miles an hour. The experiment was repeated thrice, and the horses disengaged each time; but the impetus given to the carriage by the velocity of the horses, occasioning the coach to run forwards above twenty yards on level ground, after the horses were detached, the Committee were of opinion, that a part, but not

not the whole of the object of the Society was answered, as the passengers in the carriage might yet suffer injury from the motion of the carriage after the horses were liberated. On their noticing this circumstance to Mr. Davis, and a gripe being added to stop the motion of the wheels, Mr. Davis, on the eighth of May last, produced the present ingenious invention to the Committee; by means of which, at one pull of the chain, the horses may be liberated, and two bolts propelled on the nave of the two fore-wheels, so as to retard their motion. For this invention and apparatus, a Bounty of Thirty Guineas was awarded and paid to Mr. Davis from the Society.

Description of Mr. Davis's Model, Plate IV.

Fig. 1. A, the splinter-bar of a carriage, to which the horses are attached by

by the traces fixed to the rollers BBBB, and to the pole C.

D, a brass chain extending from the coach-box to the splinter-bar: this chain goes under the roller E, over the roller F, is then wound once round the pulley G, and thence directed by the small rollers H and I to the quadrant K, to the furthest extremity of which it is attached.

The quadrant K has a vertical axis, on the upper part of which is a pinion with four teeth, (see L, *Fig.* 2 and 3). This pinion works in two racks, MM, fixed on two elbow head bolt-bars, NN; and, by means of these racks, the bolts are moved backwards and forwards by the action of the quadrant K.

These bolt-bars extend from the centre of the splinter-bar to its extremity, the strait end of the bolts shooting into the rollers BB, *Fig.* 1. at the end of the splinter-bar, and the elbow-heads, *n n*, shooting into the two centre rollers BB.

On

On the lower part of the axis of the quadrant K is a female screw, which receives a bolt O, (see *Fig.* 3). one end of which, when bolted, passes through the bolt C: the other end of it is a male screw.

P Q are two collars fixed on the splinter-bar, which collars confine the axis, and prevent its being displaced.

Fig. 4. shows the pulley G, round which the chain D passes: the axis of this pulley contains two female screws, R S, with threads in different directions moving the two bars T V, backwards or forwards, so as to protrude them on the conical part of the naves of the fore-wheels of the carriage, and to act as a brace thereon, so as to retard their motion.

Fig. 5. is a link of the chain, in order to show its make or formation.

When the horses are to be detached, and the carriage stopped, the coachman, sitting on the coach-box, draws up

up a handle W, *Fig.* 1. affixed to the chain D by means of an iron bolt with a spring upon it, to retain it when drawn out: the chain D pulls back the quadrant K, and draws back the double bolts N N, which pass through square holes at the lower end of the rollers B. The same motion of the quadrant, by means of its female screw, raises the screw-bolt O, and sets the pole at liberty; so that the horses move off with the pole and rollers. It has been before observed, that the chain D winds once round the pulley G; by this means, when the chain is drawing up to detach the horses, the motion of the pulley propels, from its female screw on each side, bolts which have screw-heads at one end, and wedges at the other, which wedges, when propelled, act as braces on the conical-formed naves of the fore-wheels, and stop the motion of the fore-wheels.

X is a square head on the axis of the quadrant K: by means of a key applied

applied on this head, when necessary to attach the horses to the carriage, the quadrant is returned to its place, and bolts the rollers and pole, after they are replaced in their proper situations; the quadrant at the same time pulls back the chain on the pulley G, which pulley draws back the wedge-bolts from the conical naves of the fore-wheels, and sets them free to move.

A Bounty

PAPER

IN

MANUFACTURES.

MANUFACTURES.

A Bounty of FIFTEEN GUINEAS was this Session voted to Mr. THOMAS CLULOW, No. 31, Old Cock-Lane, Shoreditch, for his Invention of a LOOM to weave FIGURED RIBBANDS, a Model of which is reserved in the Society's Repository, for the inspection of the Public.

THIS Loom differs from the common figured Ribband-Looms in the method of forming the figure, which, in the old mode, was tedious, from the work being stopped, whilst the figure was drawn by the hand.

In the present Loom the tire cords, which form the figure, are drawn or

worked by a cord or leather strap fixed to the centre traddle, which strap passes over two vertical and one horizontal pulley to the back of the loom, and has a weight hung to the end thereof: upon this strap, above the weight, is fixed an iron of a bevil or sloping form, which, when the strap is pulled up by pressing with the foot upon the traddle, raises a wire lever placed across the main wheel of the movements placed vertically, and allows this main wheel to move one fourth of its circumference, where it is stopped by an iron pin placed on its rim, and prevented from returning by a clitch or catch on the edge of the wheel on its right-side. Within the rim of the main wheel is a small catch-strap connected with the strap above mentioned; this catch-strap pulls forward the main wheel one fourth of its circumference until it is stopped by the wire-lever, and one of the pins on the rim, of which there are four in number in the round.

There

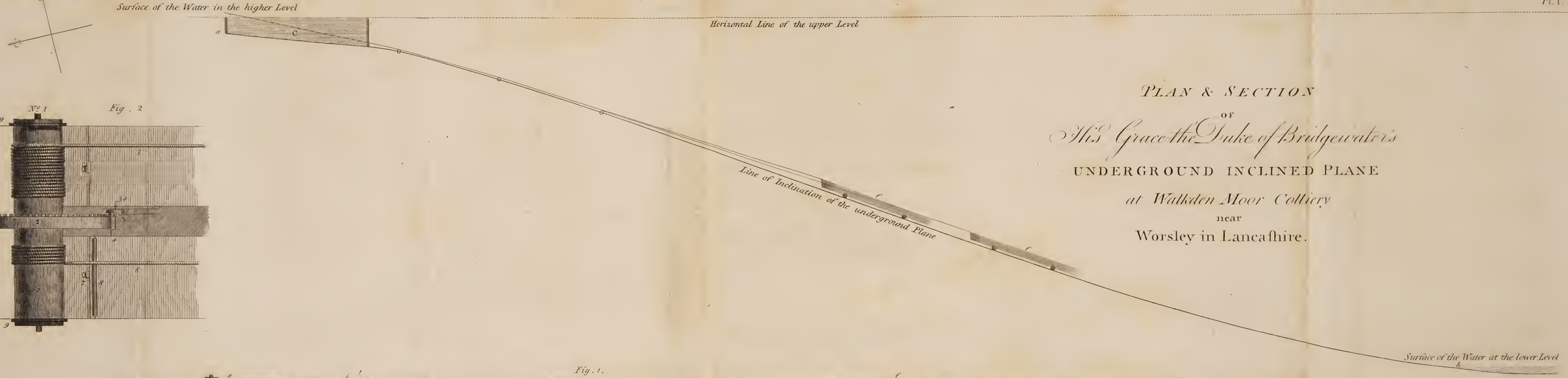
There are also four iron pins projecting from the left side of the main wheel in opposite quarters of it; these act on a hanging lever, to the lower part of which a string is attached which passes behind the box, containing the whole machinery, and raises four clicks or catches on four rollers, which permits any one of the four rollers to run back as the figure may require, each roller, by such motion, drawing up the number of threads necessary to form the figure, by cords extending from these rollers over pulleys to the pass-cords which draw the figure.

PAPER

IN

NAVIGATION AND COMMERCE.

PLAN & SECTION
OF
His Grace the Duke of Bridgewater's
UNDERGROUND INCLINED PLANE
at Walkden Moor Colliery
near
Worsley in Lancashire.


Surface of the Water in the higher Level
Horizontal Line of the upper Level
Line of Inclination of the underground Plane
Surface of the Water at the lower Level
Nº 1
Fig. 2
Fig. 1.
GROUND PLAN
Pit in rough Close

Lowry sculp.

NAVIGATION AND COMMERCE.

The Thanks of the Society were this Session voted to the Rev. FRANCIS H. EGERTON, of Bridgewater-house, for the following Communication relative to an UNDER-GROUND INCLINED PLANE, executed at Walkden-Moor, in Lancashire, by his Grace the DUKE OF BRIDGEWATER, to whom the GOLD MEDAL was voted, as a testimony of the high opinion entertained by the Society of his Grace's execution of this great work, and his wonderful exertions in Inland Navigation.

I BEG leave to present to the Society an account of the Under-ground inclined Plane, which the Duke of Bridgewater has lately made at Walkden-Moor, between Worsley and Bolton, in Lancashire,

shire. To this account I have subjoined two plans, with a table of reference to each.

At Worsley the Duke of Bridgewater's navigation begins; it goes west to Leigh, and east to Manchester, where it locks up into the Rochdale canal. In its way to Manchester, it turns out, in a western direction, near Longford Bridge, to meet the Grand Trunk Canal, above Preston Brook; and from thence it goes north-west to Runcorn, where it locks down into the Mersey, in the tide-way to Liverpool.

To this navigation above-ground, which, in all its directions, is extended through a length of * forty miles, upon one

* *Forty miles upon one level.*] Adding to these forty miles, nearly twelve miles of the Duke of Bridgewater's Underground Navigable Canal, which lie upon his lower main level, and including eighteen miles of the Grand Trunk Canal betwixt the lowest lock between Middlewich and Preston-Brook, there are seventy miles of navigable canal, without a lock, upon one level, eighty-two feet above low-water mark; whereby a communication is obtained between London, Liverpool, Bristol, and Hull. At this lowest lock the Grand Trunk Navigation locks down, to be upon a level with the Duke of Bridgewater's.

one level, without tunnel or lock, except the locks at the extremities. At Worsley, an under-ground navigation is joined, which goes to the different mines of coal under Walkden-Moor; from which mines, by these navigations above-ground and under-ground, Manchester and various other places are supplied with that valuable article.

The canals of this under-ground navigation lie upon two levels, or stories.

The lower is upon the same level with the open navigation, which it joins at Worsley; and consists, in the different lines which it pursues to the different seams of coal, of near twelve miles of tunnelling.

The higher is thirty-five yards and a half perpendicular height above the level of the lower, and varies from thirty-eight to sixty-one perpendicular yards below the surface of the earth, and consists of near six miles of tunnelling.

The

The tunnelling of each level is ten feet four inches wide, and eight feet six inches deep; and the depth of water, three feet seven inches.

Before a communication was made by an inclined plane, the coals were discharged by hand from the boats on the higher level, and were let down the pits in tubs by an engine and a break-wheel into those upon the lower. To convey the boats themselves from the canals of the higher level into that of the lower, was the intent of making this underground inclined plane. By the help of this machinery, the whole business is now done at once, without discharging or damaging the coal, and at one fourth of the expence: for the boats of the higher level are bodily let down the inclined plane, and are floated from the foot of it through nearly three miles, in a strait line, of the lower level canal, into the open navigation at Worsley: and, whereas they were before obliged

to

to be drawn up to the surface of the earth at great inconvenience and expence, to be repaired at a work-shop on Walkden-Moor, they now come of themselves, in their course of business, to be repaired at the great dock-yard at Worsley.

The place where the inclined plane is constructed, is adapted in a singular way for the purpose. There is a bed of white rock, or grit, eight yards twelve inches deep, which dips one in four, lying exactly in the direction most convenient for the communication between the two levels; which bed of rock is hollowed into a tunnel, driven upon the rise of the metals, by blasting with gunpowder, and working it down with wedges and hammers. In this tunnel, formed through a rock reaching from the lower to the higher level, the inclined plane is fixed; and, by its being in the heart of a rock, the whole workmanship can be pinned, secured, and compacted together

together at the top, bottom, and sides, most effectually :—an advantage which no inclined plane above-ground can have, and which renders this a singular production, no where perhaps to be imitated.

The run of the inclined plane is one hundred and fifty-one yards, besides eighteen yards, the length of the locks, at the north or upper end : and the fall is one in four, corresponding with the dip of the rock.

Of these one hundred and fifty-one yards, about ninety-four yards are formed into a double waggon-way, in order to let two boats, namely, the empty and the loaded boat, pass up and down; and are divided by a brick wall, supporting the roof, in which are openings for a person to escape out of the way of the boats ; which double waggon-way joins in one, about fifty-seven yards from the lower level.

The

The whole width of the double waggon-way is nineteen feet; and of the single waggon-way, after the junction, ten feet.

These waggon-ways are supplied with iron rails, or gullies, laid on sleepers, down the whole run; and the height of the roof, above the iron rails, is eight feet.

At the top of the inclined plane there is a double lock, or rather two locks, side by side, formed in the heart of the same rock, which deliver the loaded boats from the higher level down the inclined plane, and receive the empty boats from the lower. The length of that part of the tunnel in which these are formed, is eighteen yards; the width or diameter, twenty feet six inches; and the height of the roof, at the north end and above the locks, at *d d*, *Plate V. Fig.* 1. twenty-one feet, to admit the break-wheel.

The

The bottom, or south end of the inclined plane, is six feet nine inches under the surface of the water, where the loaded boat floats off the carriage upon the canal of the lower level.

The depth of the locks, under water, at the north end, is four feet six inches; at the south end it is eight feet.

The wall between the locks is nine inches above the surface of the level water; its breadth is three feet.

The diameter of the horizontal main-shaft, upon which the rope works to let the loaded boats down, and to draw the empty boats up, is four feet eleven inches, and its circumference is fifteen feet five inches. The main-rope is two inches and a half in diameter, and seven inches and a half in circumference. It is lapped round with a small cord of about an inch in circumference, for the length of about one hundred and five yards, to prevent its wearing, which it does chiefly when it drags upon the bottom,

tom, when at work, at the place where the waggon-ways unite; and, for the same purpose, rollers of eight inches diameter are fixed at intervals down the run of the inclined plane. Moreover, a hollow cast-iron roller of eight inches and a half diameter is fixed across the west lock, parallel to the upper west lock-gate, and near the north end of the lock, but half a yard higher than the gate, in order to bear up the rope, and to prevent it from swagging.

A hold-fast rope is fastened to the main-rope, to stay each boat upon its waggon, as they go up or down. It is marked *k k*, in *Fig.* 1, *Plate V.* and its uses are more particularly detailed in the table of reference, at *k k*, to that plate.

Upon this horizontal main-shaft is a break-wheel above mentioned, which regulates the motion of the loaded boat going down the inclined plane.

The number of iron teeth, or cogs, in the spur-wheel, which is fastened to the

side of the break-wheel, is three hundred and seventy-two; and the little nut-wheel, *No.* 3, *Fig. II.* which sets it in motion, contains eleven teeth, or cogs. The nut-wheel is supported by two uprights from the pillar to the roof, and works between them. Two winches or handles, *No.* 4 4, *Fig. II.* on its axis, put the main-shaft, *d d*, *Fig. I.* or *No.* 1, *Fig. II.* in motion. The power of both united enables a man, who uses a force equal to forty pounds weight, to set forward two tons upon the waggon-road: and this force, multiplied at the winches or handles, may be used to set forward the loaded boat out of one lock, and to bring the empty boat into the other. The boats being thus put in motion, the little nut-wheel is disengaged from the main-shaft, by a slide drawing the little nut sideways, so as to disengage the teeth, or cogs, from the cogs of the spur-wheel. The weight of four tons going down bring up about one.

The

The spur-wheel, however, which is fastened to the break-wheel, *No. 2, Fig. II.* is seldom used, as it is occasionally only put in motion to regulate the stretch of the ropes when new, and to draw the light boat into the lock, when, at any time, it may happen to be over-weighted with materials, such as mortar, props, slabs, &c. for the use of the higher level collieries, and will not move of itself, upon a balance, out of the lower level.

The length of the carriage, or cradle, is thirty feet; its width is seven feet four inches. It moves upon four solid cast-iron rollers, which run upon cast-iron plates; on one side of each of which there are iron crests, which stand two inches higher than the plates, and prevent the carriage from running off the road.

The weight of neat coal, contained in the loaded boat, is about twelve tons: the boat weighs about four tons; and

the carriage, or cradle, in which the boat is placed, when conveyed down the inclined plane, is about five tons:—in all about twenty-one tons.

At this inclined plane thirty loaded boats are now let down, with ease, in about eight hours; that is to say, four boats are let down in a little more than an hour. The boats used in these collieries are of different sizes and dimensions; some will carry seven, some eight and a half, some twelve tons.

The weight of neat coal, independently of the weight of the carriage and boats which is let down the inclined plane, in twelve-ton boats, in eight hours, will consequently be three hundred and sixty tons. The weight of the carriage, suppose five tons, let down in the same time, will be one hundred and fifty tons; and the weight of the boat, suppose four tons, thirty times down, in eight hours, will be one hundred and twenty tons:—in all six hundred and thirty tons down in eight hours.

The

The weight of the carriage thirty times up, and thirty boats up, in eight hours, will be

Carriage, at 5 tons, 30 times up = 150 tons
Boat, at 4 tons, 30 times up = 120 tons

In all 270 tons up in eight hours.

So that there will be 630 tons down
270 tons up

In all 900 tons moved at the inclined plane, in 8 hours, exclusive of an indeterminate quantity of materials occasionally brought up for the use of the higher level collieries.

The various feeders which are loosened by opening the coals in the higher level collieries, as well as three sufficient re-

servoirs, which may occasionally be resorted to, and used in a dry season, keep the higher level always to its height, and afford a constant supply of water to fill the locks, for the purpose of working the inclined plane.

This inclined plane was begun in September, 1795; it was finished, and in use, in October, 1797.

Of this, as of most of his other great works, the Duke of Bridgewater was himself the planner and contriver:—to project greatly, and to execute completely, are the perfection of genius.

The singularity of the place in which it is constructed; the original boldness of the design; the ingenuity and mechanism displayed in planning and executing it; the dispatch with which it has been finished; the simplicity, beauty, and harmony of its parts, tending to one united whole; and, above all, the perfection to which it is proved to have been brought, now that it is practically in use; render

it

it equally astonishing with any other of the stupendous works which have been so ably planned, and so successfully executed, by the first projector and patriotic father of Inland Navigation.

I have the honour to be, &c.

FRANCIS H. EGERTON.

Bridge-water-House,
March 5, 1800.

REFERENCE *to Plate V. being a Plan and Section of his Grace the* DUKE OF BRIDGEWATER'S *Under-ground Inclined Plane, at Walkden-Moor Colliery, near Worsley, in Lancashire.*

Figure 1.

a to *b*, Dip of the metals and waggon-road on the under-ground inclined plane. From *b*, on the lower level, to the mouth of the tunnel, is three miles.

A, The east lock.

B, The west lock.

C, Represents a section of the lock: the dotted line shows the horizontal depth, and the black line under it, the slope upon which the waggon-wheels run to receive the loaded boat, or to bring the empty boat into the lock.

d d, The main-shaft, four feet eleven inches diameter, upon which the ropes work to wind the boats up and down; and here also the break-wheel is fastened on,

on, together with a spur-wheel, and a nut-wheel. See *Fig. II. No.* 1.

e, A passage betwixt the higher level and the locks.

f f, A loaded boat going down, and an empty boat going up the under-ground inclined plane.

G, A brick wall from the sole to the top of the inclined plane, in order to give additional support to the roof.

h h h h, Openings through the brick wall *G*, into which a person may step out of the way of the boats, at the time they are passing up and down.

i, A bell, which is rung by the rope dotted to *b*, upon the lower level, at the bottom of the under-ground inclined plane, to give notice when the empty boat is upon the waggon, or cradle, and when the men below are ready, that the loaded boat may be let down by the men above.

k k, Holdfast-ropes fastened to the main-ropes, and hooked on to a ring at the south end of each boat, as it goes up or down, in order to stay the boats upon the

the waggon or cradle, that they may not swag, or slip off. These holdfast-ropes are spliced on to the end of the main-ropes, and run above and between the two bridle-ropes when they are fastened to the iron uprights, which are upon each side of the waggons, or cradles; and they run over the north end of the boat, to be hooked on to the south end.

l l, The bridle-ropes fastened to the main-ropes at *O*, and secured to two iron uprights upon each side of the waggon, or cradle.

O O, The places where the main-ropes, the bridle-ropes, and the holdfast-ropes, are fastened all together.

No. 1. An open space driven into the side of the lock *A*, to which a pit is sunk from the higher level, in order to convey the water out of the locks down to the lower level, and also to force a current of fresh air into the lower level collieries.

No. 2. A paddle to let the water out of the lock *A*, into the pit *No.* 1.

No.

No. 3. A paddle to let the water out of the lock *B*, through a culvert, represented by dotted lines, under the lock *A*, into the pit *No.* 1.

No. 7, 7. Paddles in the lock-gates, to let the water out of the higher level into the locks.

No. 8, 8. The two north lock-gates, one to each lock, which turn upon the heels of the gates, and swing round when they are opened or shut.

No. 10, 10. Two stops or cloughs, one to each lock, which serve as lock-gates to the south end, and are raised and let down by a windlass.

S, A stop, which is used occasionally when the lock-gates want repairing.

T, The place where the boats which are to pass to or from the lower single waggon-way are directed, at pleasure, into either part of the double waggon-way, by a moveable iron sleeper or plate at that point, upon which sleeper or plate the wheels of the boat-carriage or cradle run.

TABLE *of* REFERENCE *to Plate V. Fig. 2, of his Grace the* DUKE OF BRIDGEWATER'S *Under-ground Inclined Plane, at Walkden-Moor Colliery, near Worsley, in Lancashire.*

1. Main-shaft, on which the rope laps.

2. Break-wheel, on one side of which the spur-wheel is fastened.

3. Nut-wheel, out of geer, but which slides into the spur-wheel, when used to draw the empty boat into the lock occasionally, and which is supported by two uprights from the pillar to the roof.

4, 4. Winches or handles, to work the nut and spur-wheel.

5, 5. The main-ropes fastened to the boats, and which are lapped to prevent their wearing.

6. The spur-wheel, which is fastened on one side of the break-wheel; and on which break-wheel is a strong iron-jointed timber brace, which, according to the pressure

pressure given thereto by the man who attends it, will allow the loaded boat to descend quick or slow, or detain it in its passage.

7, 7. Paddles in the lock-gates, to let the water out of the higher level into the lock.

8. A hollow cast-iron roller, to prevent the main-ropes from swagging.

9. Shroud-wheel, to prevent the ropes going over the end of the main-shaft, slipping off, jerking, or breaking. This stands three inches above the main-shaft.

PAPER

IN

COLONIES AND TRADE.

COLONIES AND TRADE.

The GOLD MEDAL, being the Premium offered by the Society, in 1792, to the person who should first discover a PASSAGE by LAND from the North-West parts of Upper Canada to the South Sea, between Nootka Sound and the Straits of Kamschatka, or to the navigable part of any River that disembogues itself into the South Sea, within those limits, was this Session adjudged to ALEXANDER MACKENZIE, Esq. in consequence of the following Accounts and Certificates.

SIR,

AGREEABLY to your Excellency's request, I beg leave to acquaint you, that on the 9th of May, 1793, I, in a bark-canoe, left one of our settlements in the North-West, on the Unjegah or Peace River, latitude 56° 9′ North,

and longitude 117° 43′ West from Greenwich, for the purpose of penetrating to the Western Ocean. I followed up the waters of this river to their source, and carried my canoe over the height of land, which is only seven hundred yards; from thence I continued my route down a small river, which I found to discharge itself into the branch of a large one, which the natives call Tacoutch Tesse, or Tacoutch River. We were carried down this river by the strength of the current with great velocity. I found that it took too much of a southern course to bring me to the sea so soon as I intended; and, from the best information I could procure, I judged that it did not discharge itself to the northward of the river of the West, a branch of which, if not the whole of that river, I conceive it to be. Though I was sensible that this was the best, but not the shortest communication with the sea, circumstances would not admit of my taking it; therefore I returned up the river

river five days journey, then left my canoe, and such part of her lading as we could not carry with us, in latitude 53° North, and longitude 122° 43′ West. After travelling fifteen days, I arrived at the Western Ocean.

The sea along the coast being much interspersed with islands, I borrowed a canoe, and went out amongst them about twenty leagues. I found myself to be in Middleton Sound, in latitude 52° 23′ North, and longitude 128° 15′ West; from which place I commenced my return the 23d of July, by the same road which I had passed, and arrived safe with my people, on the 24th of August, at the place from whence I had taken my departure.

I have the honour to be, with respect,

Your EXCELLENCY'S

Most obedient humble servant,

ALEXANDER MACKENZIE.

Hind's Tavern,
Sept. 10, 1794.

His Excellency Governor SIMCOE.

Extract of a Letter from Governor SIMCOE *to* WILLIAM WALCOT, *Esq. of the Inner Temple, dated Sept.* 13, 1794.

I PARTICULARLY address myself now to you, inclosing Mr. Mackenzie's letter to me, and desiring you to call on Mr. More with it, and offer my best regards. You will be so good as to make with him any further arrangements necessary for me to certify, that Mr. Mackenzie has penetrated to the Pacific. He is " open, bold, and brave."

SIR,

UPON inquiry about the Certificate necessary to show the Society that Mr. Mackenzie did perform the journey that entitles him to the Gold Medal, voted by them, I have to inform you, that

that General Simcoe (who is at present in town) will satisfy every doubt that can arise on that head; as I understand that the General, some time ago, presented Mr. Mackenzie with a piece of plate, with an inscription suitable to the occasion, as a testimony of regard and admiration of his spirited enterprise. If any further proof is wanting, a reference to Lord Grenville and Earl Spencer, with whom Mr. Mackenzie had an interview, will put the matter entirely out of doubt.

I am,

Dear SIR,

Your most obedient servant,

PAT. SMALL.

Arundel-Street,
April 15, 1800.

To JOSEPH COLEN, Esq.
New Inn, late Governor
of York Fort, Hudson's
Bay.

SIR,

I HAVE formerly taken steps to certify to the Society instituted for the Encouragement of Arts, Manufactures, and Commerce, that, during my administration of the Government of Upper Canada, Mr. Mackenzie, of the North-West Company, had passed from Upper Canada to the sea-coast of the Northern Pacific Ocean, and thereby fulfilled the terms on which the Society were pleased to offer a Medal, for the encouragement of this arduous undertaking. I take the liberty, at present, in order to substantiate the claim of Mr. Mackenzie, as far as in me lies, to desire that you will be pleased to inform me if any further means may be necessary for that purpose.

I have the honour to be, SIR,

Your most obedient servant,

J. G. SIMCOE,

Late Lieut.-Gov. of Upper Canada.

London, April 28, 1800.

To Mr. CHARLES TAYLOR.

THE Society are informed, that a particular Account of Mr. Mackenzie's interesting Journey will soon be published. A Map of Canada, on which this route is delineated, has been presented to the Society by Governor Colen.

ADDITIONS

IN

AGRICULTURE.

Mr. Bucknalls Method of planting Fruit Trees.

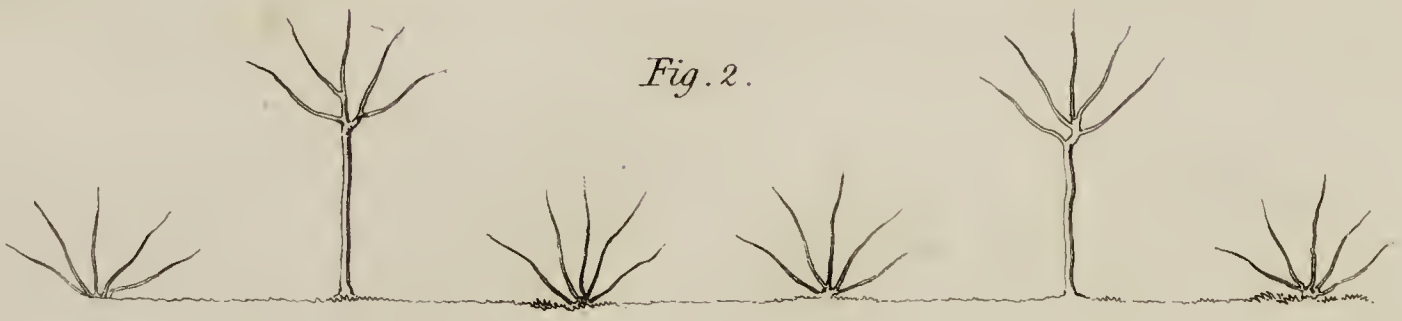


Fig. 2.

Mr. Lakes Orchard at Woodstreet.

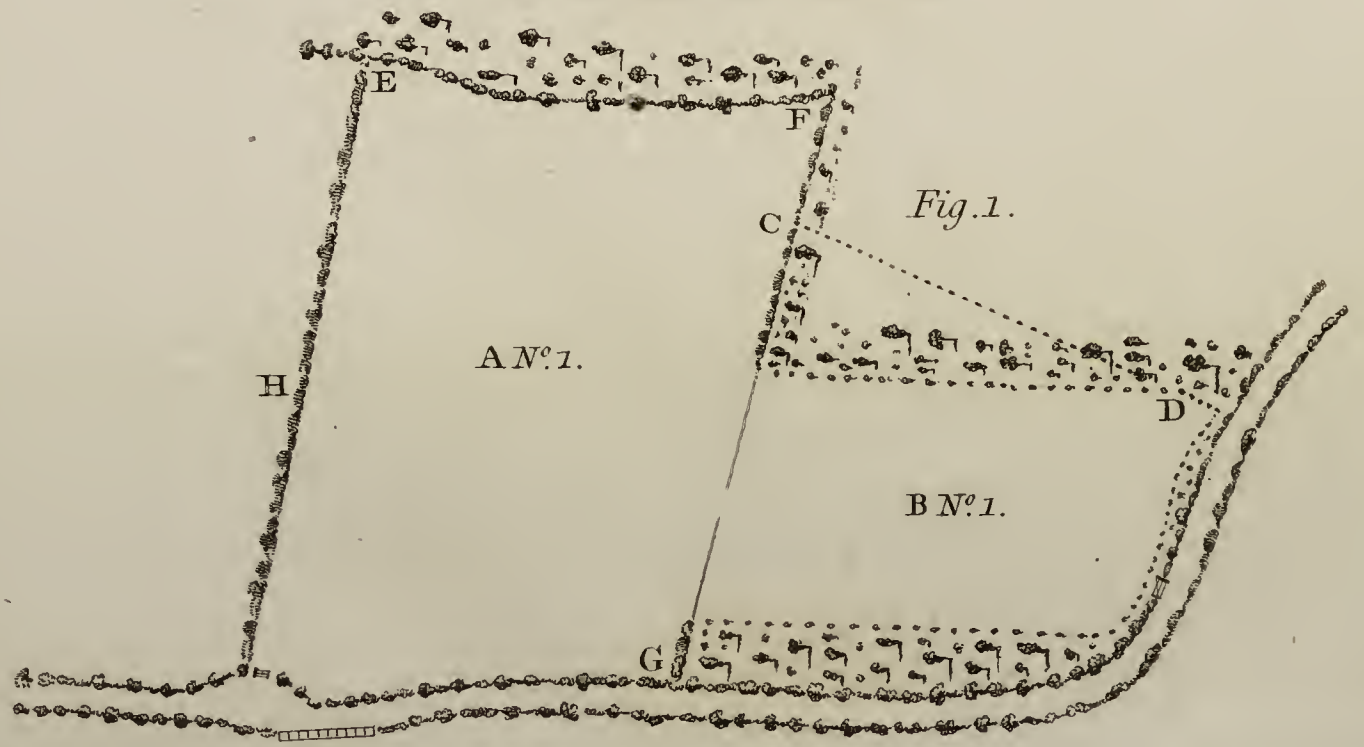


Fig. 1.

Niduses of Insects magnified.

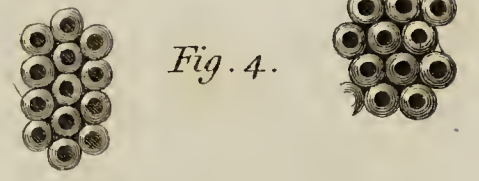


Fig. 4.

Niduses of Insects of their natural Size.

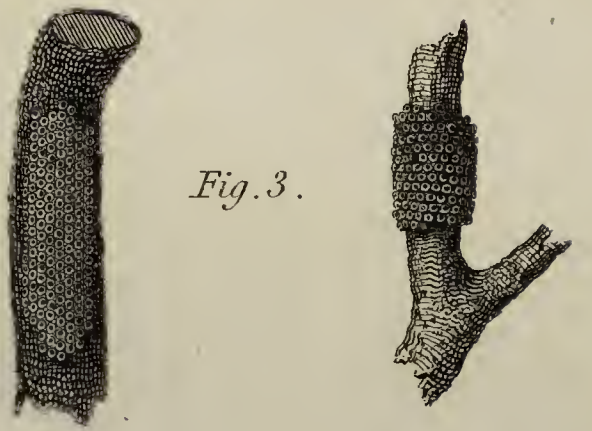


Fig. 3.

This Plate was presented to the Society of Arts &c, by T.S.D. Bucknall Esq.r

Lowry sculp.

ADDITIONS IN AGRICULTURE.

The Thanks of the Society were this Session voted to THOMAS SKIP DYOT BUCKNALL, Esq. M. P. for the following Communication relative to the causes of BLIGHT ON FRUIT-TREES, and to the methods of producing good and certain Crops of Fruit; being a supplementary paper to various letters on Orcharding and Blight, already inserted in several volumes of the Socciety's Transactions. Mr. Bucknall has given a fresh instance of his good intentions towards the Society, by the present of an engraved Plate annexed, describing three niduses of Insects; the mode he recommeds of planting dwarf and standard Fruit-trees; and a ground plan of Mr. Lake's Orchard, noted in page 96, which was laid out under Mr. Bucknall's direction.

DEAR

DEAR SIR,

I HAVE read over your observations on Blight with great pleasure; and I do not feel that I have any thing to add, except that much may be done by choosing fruits whose blossoms are patient of cold and wet, as well as of heat; and such, I know, may and will be obtained from seed. I have now among my new fruits some whose blossoms are so tender, that every one will fall with a degree of cold that will not be fatal to a single blossom of an adjoining tree. I do not attribute this solely to any defect in the blossom of the one, or to the perfection of the other, nor to want of health; but I have good reason to believe, that the same degree of cold which will suspend the progress of vegetation in one plant (and, of course, in every graft taken from it), and paralyse all its powers, will have no sensible action on another. Health, I admit,

mit, will do much, and youth (or young variety) will, I think, do more; for I see many of my new fruits, which bore heavily last year, prepare to blossom again with vigour this year: but much will still depend on the varieties being naturally patient of cold, &c. Last year I had frequent occasion to observe, during the autumn, that the same crop of fruit which totally suspends the growth of a grafted tree of a middle-aged variety, will scarcely affect that of one whose parent stock has but just obtained the bearing age.—When you reprint your Orchardist, I shall have great pleasure, if I can send you any thing worth adding to it. It is my intention to pay much regard to the progress and suspension of the sap in changeable weather next spring; and something may possibly occur that I may think worth sending you. I am about publishing a second edition of my Treatise, much enlarged; but I have

have not yet found industry sufficient to complete it.

Yours sincerely,

THOMAS ANDREW KNIGHT.

Elton,
June 3, 1800.

To T. S. D. BUCKNALL, Esq.

SIR,

UNDER the Classes 80 to 83, in the 17th volume of your Transactions, very handsome Premiums are offered for preventing Blight on Fruit-trees, or taking off their ill effects. Having long attended to the subject, and being anxious to gain further information, I dedicated my time, during the month of September, 1797, to a tour through the Cider-countries; also during the greater part of June and July, 1798, and August, September, and October, 1799; choosing to

to vary the months in each year, for more full information on the subject: and I beg this may be considered as a further attempt to ascertain the causes of Blight, and trace the most effectual means of preventing or taking off its ill effects, and in part disposing the trees to produce a small valuable crop of fruit nearly each year, instead of suffering what in the Cider-countries is called a *hitt*, which generally happens once, twice, or thrice in nine years. This hitt, or superabundance of fruit, is very destructive to the trees; for so great a crop weakens them very much, filling the stores with fruit and liquor to an extent far exceeding the stock of casks and cellar-room, so as to confound the grower, lessen the value of the property, and intoxicate the country.

This evil is noticed by Billingsly in his report for the county of Somerset, wherein he says, many sensible men are of opinion, that Cidering to any great extent

tent wastes the land, and is detrimental to the country. I, who choose to take the other side, aver that a fifth part of the land now appropiated to orcharding, were it judiciously managed, would produce to the country more value in money than all the present plantations, and make that business a real source of riches to the nation. Should a few ingenious men, in good situations, turn their thoughts to Cider-making, choose those new varieties which are known to possess superior qualities, and make Cider an article of trade to the West Indies, the Orchards would have a very different appearance from the present. It would be very easy to give a stronger body to the Cider, so as to bear exportation, merely by a process on the juice of the apple.

The Orchardist had sufficient rules for general practice as to the management of Fruit-trees, at the close of the Paper in the 14th volume, had not Blight, and the natural

natural effects of the different varieties of the Cider-fruits been started, which led me to think it necessary to improve the work, by adding a Paper, in the 17th volume of the Transactions; and I now beg your indulgence for the following remarks

On Blight.

This being intimately connected with my favoutite object, the improvement of Fruit-trees, I shall submit to your observations a further collection of facts, which I think will tend considerably to lessen, if not in part eradicate, this growing evil.

Blight originates from many causes; several of which I have pointed out before, each requiring a different description and mode of treatment, according as it arises from the air, soil, water, heat, extraneous vegetation, accidents, or insects. I shall therefore treat of Blight under these different heads.

A free circulation of air is essentially important to secure the health of the tree; indeed there can be no good vegetation without it.

Absorption and emission of air are well known to take place throughout the vegetable system for its support; and where circulation is impeded by a multitude of branches, or by trees standing too close together, Blight is the inevitable consequence. This, therefore, may be prevented, by clearing away the clustering branches long before they may have so far encumbered the trees as to give them a disposition to blight, as I have remarked in the first paper on pruning:

"Consider whether a branch will be in the way three years hence; if it will, the sooner it is taken off the better."—Eleventh Volume, p. 18.

Mr. William Lake has observed to me that Fruit-trees should be left with one aspiring top, which tends, where pruning is neglected, to keep the branches more

equally

equally asunder. Remember, no leading branch is ever to be shortened, except to improve the figure of the tree; in which case it is to be cut close to the separation.

When the branches or trees are so close together as to prevent a free and active circulation of air and sun, the encumbered parts soon decline in growth, and the due flow of the sap is obstructed, the wood grows torpid, rots, dies, and falls off. When this happens, the grass beneath ceases to grow; a cold, damp, offensive smell arises; few blossoms are formed on those parts of the tree, and those never duly impregnated; consequently, the branches become unproductive, and are justly said to blight.

Now, to place this evil in its true light, I wish I might be allowed to use the word pulsation; for, in a healthy tree, when the sap flows, there is a regular irritation or motion, which impels it forward: the organization of this func-

tion being very delicate, is easily destroyed; and there is no other way of removing the evil than by cutting off the torpid branches, and clearing away whatever may obstruct the sun and air; and, in general, if the habit of the tree be healthy, these parts will recover.—'Remove the cause, and the effect ceases.'—This I noted in the 14th volume of the Transactions, and in the Orchardist.

The soil is another most material object of attention in the management of Fruit-trees, on which I shall only observe, that if the soil is replete with mineral particles, they may occasion blight by obstructing those vessels in the roots which convey nourishment to the plant. In such soils you may frequently, on minute examination, observe a yellow or orange-coloured calx of iron separated from the earth, and precipitated on the roots, which prevents the absorption of proper food. Soils containing metals which dissolve in water, should be avoided; but

but if a plantation has been actually made in such soils, the best method of preventing the Blight arising from this cause is to cut away the tap-roots which have struck into the under-soil, and encourage the increase of those which run horizontally. But the most important and beneficial precaution is to lay a good coat of manure upon the surface, as soon as the under-roots are taken off.

Water is most frequently the cause of Blight, particularly from land-springs, which should be carefully drained off, otherwise it were better never to plant at all. The best method is to let the drain run directly under the respective rows of trees; but be sure they be not small. The most completely planned orchard I ever saw has been totally ruined for want of this precaution, and a sufficient quantity of manure; and a tree, now one of the finest More-park apricots in this country, was planted seventeen years ago, by way of experiment, on the crown

of a large stone-arched cellar. These facts are well worthy of attention. Whenever the land is kept cold from under water, Fruit-trees can make no progress, and generally canker; also, where water remains stagnant for any length of time about the roots of trees, the tender fibres are chilled, and thereby destroyed. I am here only speaking of noxious waters; for pure water judiciously, frequently, and sparingly applied, is one of the best agents for keeping Fruit-trees in permanent health: first take all the proper precautions, then water, and the tree will probably not blight. This must, of course, be understood of good situations.

Heat, much oftener than cold, proves destructive to vegetation, by causing blight. I speak of the quick transition from heat to cold, for that does the mischief. Thus, what is called honey-dew, originates from heat checked by succeeding cold, which occasions the sap and saccharine juices to coagulate on the surface

surface of the leaves, and greatly injures the tree, by impeding its growth. But I have more fully considered the alternate succession from heat to cold in my last paper. See Vol. 17th.

Honey-dew is very detrimental to trees, by stopping the pores of the leaves. Old and decayed trees are much subject to this evil, from the sap running more to a saccharine juice.

Mr. Knight, and the Author of the Worcester Report, ascribe honey-dew to insects. Should it be insects, the fat of hogs, or rusty bacon, rubbed on the body of the tree, would disgust them, and prevent the mischief, and would also keep hares and rabbits from biting the bark.

Blight is also caused by extraneous vegetation, I mean moss or other vegetable productions, that are suffered to grow on the bark of fruit-trees: these prey upon the juices and nourishment of the plant; and, by preventing a proper

circulation of the sap, produce blight. This evil, if taken in time, is so easily removed by the brush and soap-suds, that I shall not enter further on the subject here, than to remark, that washing makes the stem and branches most delicately smooth and soft, if the practice be taken up from the first plantation of the tree.

Accidents, carelessness, and the suffering vermin to continue eating and fretting the tender bark, are very great causes of blight, often debilitating a large branch in a short time, and bringing on sure destruction to the tree. This is most effectually prevented by cutting and cleaning out the wounds, and using the medication as directed in the 11th volume, where there is a note on vermin. To avoid any of the causes above enumerated, examine the trees often, and remove all the

Impediments to Health,

as soon as they are perceived. Do not regard the time of the year, but stop every

every evil in the bud; and be assured that the knife does not injure the tree even in summer, and when it is full of leaves, for the growth is then so free that the wound only heals the better. Summer, indeed, is the best time for scoring trees, when the bark is too close for the tree to grow.

I shall now notice the last, but, by no means, the least of the causes of blight, which I have mentioned before, in the 17th volume of your Transactions, p. 274; I mean INSECTS, which are certainly the grand cause. I have there given it as my opinion, "that insects do not come over in the winds from the Continent, but are bred at home, from the eggs deposited about the tree in summer and autumn."

I am well convinced, that a minute observer will find this to be the fact; and, in confirmation of my opinion, I beg leave to lay before you three niduses or repositories for the eggs of insects: one of which contains 578 cells, another

650, and a third 880; each nidus being formed upon, and adhering to a very small twig: the account of which is well authenticated, and leads to a consideration of the power of insects to do much mischief to infantine vegetation. I beg those Gentlemen who have patronized attempts to raise silk in this country, and have observed the production and nourishment of the Silk-worm, to consider the probable quantity of leaves and blossoms that are eaten by insects; reflect upon the quantity of vegetable matter required for the nourishment of 2108 insects, the number produced in these three niduses; and observe the small space they occupy, and how easily they escape notice. An engraving of two of these niduses, in their natural size, appears in *Plate VI. Fig. 3.*

For destroying insects, I cannot too strongly, or too often recommend the frequent and careful examination of Fruit-trees, and the gathering every nidus that

that may be found. The task is not so difficult to execute as it may at first appear, and should be undertaken early in the spring, before the buds expand; you may then destroy in a short time many receptacles of 500 to 700 insects, which cannot, at a more advanced age, be killed by fumigation, or collected by the hand, without infinite trouble. The niduses should be collected in a bag or box, and burnt; for if merely thrown upon the ground, the insects will still be produced.

The niduses are of various kinds; some adhere to the bark of trees, and contain an infinite number of small cells, in which the ova are deposited, as in the specimens I lay before you. Others are formed in small bags, or downy matter, of a substance resembling a spider's web; others in leaves, curled up with great care. It is in all these stages of their production that they should be discovered and destroyed; otherwise the same

warm

warm day that brings forward vegetation, hatches the insects, supplies them with food and shelter, and renders the evil difficult to be cured, though at a more early stage it might easily have been prevented.

As a proof that this operation is neither difficult nor tedious, it has actually been practised during three successive years, on four acres of a newly-planted Orchard, of which proof has been adduced before the Society. I would say to the public, 'Go thou and do likewise;' but the greater part of the trouble may be saved by proper cleaning in the preceding autumn.

Were it possible to contrive a regularly progressive flow of heat and cold, according to the will of the director, and regulated by the thermometer, Blight might actually be prevented. To prove this, I mentioned *the Hampton-Court Vine* in my paper inserted in the Transactions of the Society last year. This plant is kept

kept perfectly healthy and productive, merely through being regularly washed, pruned, cleaned, and protected from the external elements.

Let thus the attentive Orchardist see, foresee, and remove every evil in his power, and nature will do the rest.

These various modes of preventing Blight, according to circumstances, are confirmed by my own observations, during more than ten years of assiduous care and attention, and have approximated as nearly to the object as the nature of the case admitted. It is my wish the Society should be in possession of a regular series of principles on this important subject.

It is not easy to imagine how much benefit would result from what I call plantations of slips, shaws, and shelter, to protect the blossoms in spring, and the fruit in autumn. See *Plate VI.* To explain this, let four acres and a half be marked out for an orchard; then plant a slip of land, one

pole

pole wide, with sweet chesnut Huntingdon willow, or any other free-growing wood, in six rows, extending along the three cold sides. If the ground be twenty-seven poles square, this slip would occupy half an acre, and if kept clean, the wood would more than pay its expence; whereas to build a wall to this extent, would require a thousand pounds, and not be so efficacious. In the Green Park, Westminster, is a plantation of horse-chesnuts, about eight years old, feathering down to the ground. Such trees would afford ample protection to a plantation so defended.

Let the shaws be properly raised, as before directed, to secure shelter and warmth to the plantation. Make the trees perfectly clean in autumn, and cover the ground, as far as the roots may be supposed to extend, with proper manure. Examine the buds as they swell; and, if strong easterly drying winds prevail in the spring of the year, then eject, with a

garden

garden machine, two or three pails of water every morning, over the whole tops of the trees.

It may be said, that it is impossible to do this on an extensive plantation; but let me advise the experiment to be made on a few trees, and you will find the time to be well employed; and if there is a great return from the produce, you will be encouraged to persevere. One great objection may be the want of manure, as that, you may suppose, cannot be spared from the farm-yard dung. I can however suggest a method whereby you may constantly procure, for four acres of land, as much manure as is necessary for a term of twenty-one years, without expending six-pence. This will be explained under an account of an Experimental Orchard, or Fruit-Garden.

I am not ashamed to own, that I feel a pride in being able, so far, to have accomplished the improvement of standard fruit-trees, to some satisfaction. The

principles

principles I have endeavoured to establish may be depended upon; but the practical part still remains very defective, and will depend on the energy and exertions of the country at large. I would particularly request gentlemen to consider the power of the new varieties. At a distance from towns, few persons are without one or more apple-trees; therefore let me beg that each may do something, for public happiness is but the result of that portion of general good, which arises from the exertions of individuals.

With the highest respect to the Society, for their regular attention to my observations, and attempts to perfect this valuable branch of Agriculture, which sheds upon mankind the blessings of Pomona,

I am, SIR,

Your most obedient servant,

T. S. D. BUCKNALL.

Hampton Court,
February 25, 1800.

MR. CHARLES TAYLOR.

SIR,

THOUGH the time of the Sessions is over, permit me to add a few observations, and a further proof, that insects are deposited about Fruit-trees, and are a material cause of Blight.

A short time past, I requested Messrs. Kirks, Nurserymen, at Brompton, to look over their plantations, to procure me two or three niduses. I left a box, containing three, at the Society's Rooms, which was opened there by Mr. Thomas Taylor and myself, on the 14th of June last, upon which there issued from it swarms of animalcula, running out of the box, and over the desk and papers; many lay at the bottom of the box, and we supposed had died for want of food. When the active ones became sufficiently settled for us to form an opinion of their number, it was imagined they amounted to between 1500 and 2000. We had no

glasses to examine them; but they appeared to the naked eye, both in size and colour, like so many small fleas.

I must remark, that Messrs. Kirks, at my desire, have undertaken to keep a register of such apples of the new varieties as may come to their knowledge, to show the trees and their fruit to their customers, and to point out where the original, primogenious, or parent stocks were raised; with other circumstances necessary to form an opinion of the value and uses of such new varieties. I particularly request that gentlemen who may be so fortunate as to raise any, would be so obliging as to send four grafts to Messrs. Kirks, to enable them to supply a part of their plantations, assigned to these experiments.

I have herewith sent to the Society, a Ground-Plan of Mr. Lake's Orchard, situated at Woodstreet-Farm, in the parish of Bapchild, in Kent, and described

scribed at page 96 of this volume as the Orchard, *No.* 1: the trees are now sheltered by the hops, which are to be removed before the Fruit premium is to take place.

When the new hedge to the northward is fully grown, as high and thick as nature will carry it, the Orchard A, *No.* 1. *Plate VI. Fig.* 1. consisting of four acres, one rood, seven poles, will be particularly well screened from the cold winds; and, in my opinion, the small opening to the Orchard B, *No.* 1. containing one acre, three roods, six poles, to the south, will admit a sufficient degree of warmth, and a free circulation of air. The method I recommend for planting standard and dwarf Fruit-trees, is shown in *Plate VI. Fig.* 2.

I have used my best endeavours, through the Transactions of the Society, for the space of the last eleven years, to elucidate the business of Orcharding;

and it is my wish to render it as perfect as possible.

I have the honour to be,

SIR,

Your most obedient servant,

T. S. D. BUCKNALL.

Hampton-Court,
September 17, 1800.

MR. CHARLES TAYLOR.

[The

[The *Plate VI.* to which the following DESCRIPTIONS apply, was presented to the Society by THOMAS SKIP DYOT BUCKNALL, Esq. M. P.]

DESCRIPTION *of Mr.* LAKE'S ORCHARDS, *noted as No.* 1, *situated at Bapchild, in Kent, for planting which he received a Premium of* THIRTY GUINEAS *from the Society; the particulars of which are mentioned at page* 96.

Plate VI. Fig. 1.—A, *No.* 1. is a ground plan of the Orchard, which contains the standard and dwarf apple-trees.

The standard-trees are planted $32\frac{1}{2}$ feet asunder: two dwarf-trees are planted in rows between every standard; therefore forty-one standard trees and eighty-two dwarfs are planted upon each acre.

B, *No.* 1, is a ground plan of the Orchard, in which standard-trees only are

planted, containing forty-one trees per acre; the intermediate spaces being filled with hops.

C, D, E, F. Shaws or shelter, planted with Spanish-chesnut, ash, &c.

G. A plantation of chesnut-trees.

H. A new hedge of quick to the north, to be trained as high and thick as nature can carry it.

DESCRIPTION *of the Method recommended by Mr.* BUCKNALL, *for planting Standard and Dwarf Fruit-trees.*

Plate VI. Fig. 2. explains the manner in which the two dwarf-trees should be planted between each standard: the standard-trees to be 33 feet apart: every tree to be pruned in such a manner as to make each row to become, thirteen years hence, an actual hedge of fruit; the intermediate spaces to be filled with hops, which are to be displaced as the trees advance in growth.

DESCRIPTION

Description *of some of the Niduses collected by Mr.* Bucknall.

Plate VI. Fig. 3. *a*, *b*, represent two of the niduses of their natural size, adhering to the twigs of trees on which they were formed: each of these contained about 700 insects. On the twig *a*, the nidus encircles the twig like a gold thread lapped round it; but the nidus on the twig *b* is on one side of it only.

Fig. IV. shows the cells in which the insects were deposited, as they appeared when magnified by a microscope.

The following Accounts of the Culture of the BEET PLANT, the application of its Leaves as Food for Cattle, of its Root for making Sugar, of its Sirup as yielding Melasses and ardent Spirit, and of its Residuum for other useful purposes, have been lately sent from Germany, along with a Sample of the Sugar, by Mr. JOHN TAYLOR, of Leipsig, to the Secretary, and by him communicated to the Society.

DEAR SIR,

IN compliance with your desire, I have taken some pains to examine into the merits of the various processes for preparing Sugar from the Beet-root, and to gain information upon the culture of the plant. You well know that Director Achard, of Berlin, first introduced this subject into general notice, and recommended

mended that the Sugar should be procured by boiling the Beet-roots, when taken out of the earth; that they be sliced when cold: that afterwards the saccharine juice be pressed out; that it be filtered, evaporated, and, after evaporation, the Sugar be procured by crystallization and pressure. That account having been printed in England, I shall not notice it further, but proceed to such other observations as have arisen from subsequent experiments.

The kinds of Beets which have been used for the preparation of Sugar from their roots, are varieties of that species called the Beta vulgaris, or Beta caule erecto of Linnæus, and of his Pentandria Dyginia class and order: they consist of the Beta rubra vulgaris, Beta rubra major, Beta rubra radici Rapæ, Beta lutea major, Beta pallide virens major, Beta alba vel pallescens quæ Cicla officinarum, and Beta communis viridis. Of these the principal are the Beta

rubra

rubra vulgaris, runkel Rube of the Germans, or red Beet of the English, and the Beta Cicla, den weissen Mangold, of the Germans, or the white English Beet; and varieties of these whose roots have coloured rings.

Method of Culture of the BETA VULGARIS *of Linnæus;* RUNKEL RUBE, *of the Germans;* LA BETTE, *of the French; or* COMMON BEET, *of the English.*

THE soil should be a good black earth, not too moist; the land should be prepared as for cabbages, namely, dunged in autumn with short rotten dung, and ploughed; turned again in spring, and then ploughed a third time much deeper than before. The land on which (Kohl) white cabbage has been planted the preceding year, answers well for the culture of the Beet, such

such land having been generally kept clean from weeds, and well dunged. The seeds are usually placed from twelve to eighteen inches distant from each other, and one inch deep in the earth. The finger is used for the purpose, or an instrument resembling a bean-setter, with this difference, that the teeth are an inch long, and the above-mentioned distance from each other. In each hole one seed is laid, and immediately covered with earth. As the field where the Beet-root is sown is easily over-run with weeds, and the Beet-plants do not spring so soon as many of the weeds; therefore the ground must be weeded in four or five weeks time, and some weeks afterwards hoed: and since from one seed three or four plants frequently grow, or by negligence several seeds are sometimes thrown into one hole, therefore the extra plants must be drawn out to be placed where there are vacancies, and the weeds must be frequently destroyed. There is this advantage

vantage in sowing the seed in the method above mentioned, that the plants remain, and are not checked in their growth by change of situation. It is necessary, however, to pick out good and ripe seed, to prevent vacant places in the field.

Some prefer transplanting the roots to sowing the seed on the ground where the plants are intended to remain; and, in such case, make use of a stick to form the hole; the length of the stick determining the distance at which the plants should be placed from each other. After the plants have been some weeks in the ground, the earth should be loosened with a hoe, and the weeds destroyed.

The Red Beet is the kind which has been usually grown in the neighbourhood of Halberstadt; and the leaves of this, and the others, are eaten, when prepared, as spinach for the table; but are principally employed as herbage for cattle, who are fed therewith in the stalls.

The

The roots are pleasant food when boiled, sliced, and eaten cold, either alone or in sallads.

As the method which Professor Gottling has invented, to separate the sugar from Beet-roots, appears to me the most easy to be put in general practice, at little expence, and best calculated for Great Britain, I shall notice it more particularly.

He recommends the Beet-roots to be taken out of the ground about the middle of September, or from that time to the middle of October, in order to have good weather to dry them: they should be washed from their adhering earth, as speedily as possible, and their small fibres should at the same time be cut off; as likewise such part of the root as in growing had risen above the surface of the earth.

The roots are to be afterwards wiped with a cloth, and laid upon a dry floor; their heads are to be cut off and given

given to the cattle: the roots should be then sliced lengthways down the middle, each half again cut into thin slices, and loosely hung on strong thread upon nails, in an airy chamber or place secure from the rain. The slices should not be placed too near together, lest they spoil, nor too many be put upon one string, lest it should break; it is adviseable to turn the strings upside down, once or twice, to effectuate a speedy drying. In the course of ten or twelve days they become so dry that the strings may be removed nearer together, in order to allow fresh Beet-roots to be hung up, if there should be scarcity of room.

In the course of fourteen days, or three weeks, they will be sufficiently dry for their sugar to be extracted. In case there may not be sufficient room to dry them in the house, they may be dried in a barn, or any place secure from the rain. Instead of placing the sliced roots upon

upon strings, stages may be made in out-buildings, or any place secure from the rain. The sliced Beet-roots may be laid on netted frames within them, as in glue manufactories; but as children may be employed to string them, you may dry on strings a greater quantity of Beet-roots in a small compass.

If the drying season is far advanced, or a frost expected, the Beet-roots should not then be exposed to the outward air, but dried in the kitchen or warm rooms on strings, or netted frames, resembling the flakes used in Yorkshire for drying oat-cakes; as the roots become dry, they may be placed closer together. The slicing of the Beet-roots, properly forms the evening's occupation: no more should be sliced at once than can be strung or placed on frames to dry, as it is not adviseable to let the roots remain in slices long in a heap. The roots may be dried in stove-rooms by artificial heat; but great care is then required to keep

keep them free from smoak, or being burnt, otherwise the sugar will be dark-coloured, and of an unpleasant taste. It is better, therefore, not to dry the roots in stoves, unless in cases of necessity, such as where the frosts may prevent the roots from being dried in the open air.

The roots should be dried throughout, and not partially. If they appear grey on the outside, they should yet be inwardly white or red; and if chewed between the teeth, have an extremely sweet taste, free from must or acidity.

In large concerns, it would be best to slice the roots with machines contrived for the purpose: such as are used in England for slicing turnips, would do the business.

Where opportunity will not permit the Beet-roots to be sliced soon after being taken out of the earth, they should be placed in cellars, and covered with straw, or put into holes in dry sandy earth, and

preserved

preserved till wanted, as potatoes are done in England.

In what degree the freezing, or longer preservation of the Beet-roots may affect their saccharine qualities, is not yet sufficiently ascertained. Some trials made at Waltersdorf did not seem to occasion any material alteration.

When the Beet-roots are dry, they are ready for their sugar to be extracted: you must then provide three wood-tubs, wide, but not deep: oak, ash, or willow will answer; but fir, or resinous wood is not proper for the purpose: earthen mugs may serve for family use. If you employ wood vessels, there should be cocks or spiggots near the bottom of the tubs, and the tubs placed in a cool situation between eight and ten degrees of Reaumur's thermometer, or fifty-two degrees of Fahrenheit's, upon a stillage, near to each other; and so high from the ground, that smaller vessels may stand

below them, to receive the liquor when drawn off.

There should be good clear water near at hand, so as to be pumped into the higher vessels.

The Beet-roots having been dried, as above directed, must be sifted, to free them from the dust and loose fibres; then having half filled one of the higher tubs with clean roots, pour clear cold water thereon, to about one third in height above the roots: let them thus remain for three hours, stirring them at different times with a wooden paddle.

After the expiration of three hours, put into the second tub as many clean dried roots as had been placed in the first; draw the sweet liquor from the first tub into the vessel underneath, and pour it upon the roots in the second: then put into the first tub more fresh water, sufficient barely to cover the roots, and suffer the tubs to remain three hours more, stirring the roots repeatedly, as before.

The

The liquor which had been poured from the first to the second tub, will be now much absorbed by the roots in the second tub. After standing again for three hours, the sweet liquor from the second tub must be drawn off, which, if the roots were of the red and white ringly sort, will be of an agreeable red colour: it must now be run through a sieve, or filtered through a flannel, and should be fit for boiling down for sugar.

After this, draw the liquor from the first tub, pour it on the second, and pour on the first tub more fresh water, and let it stand three hours longer.

Then put into the third tub the usual quantity of dry roots, and pour thereon the liquor from the second tub: remove the liquor from the first tub to the second; and the roots in the first tub being now deprived of their saccharine matter, may be used for feeding hogs or cattle.

After three hours more, the liquor should be drawn from the third tub, by

filtering, as before, and may then be boiled down for sugar.

Then draw off the second vessel, and pour the liquor into the third; add fresh water to the second vessel, and let it remain three hours more, stirring the roots from time to time.

During this time, cleanse out the first tub, and add fresh roots, as before. In three hours time, draw the liquor from the third tub, and pour it upon the fresh roots in the first; then draw the liquor from the second tub, and pour it on the third: the roots of the second tub will be now exhausted and may be given to the cattle.

After three hours, draw off the liquor from the first tub, filter it, and it will be ready to boil down. On the contents of the first, pour the liquor of the third, and put fresh water in the third tub; let it remain therein three hours, stirring it as usual: during which time clean out the second tub, and give the roots to the cattle.

In

In the second tub fresh roots are again to be placed: proceed by extracting the saccharine matter, as before, and continue the operation, till all the ready dried roots have been thus freed from their sugar.

By this management the liquor becomes more charged with saccharine matter than you find the juice is when pressed out of the roots, and a considerable quantity of fuel is spared. The roots from which the liquor has been extracted will have swelled much in the operation, and have lost their sweetness: their farinaceous residuum will, however, afford good food for cattle.

It is not adviseable to have the vessels made too large for extracting the sugar, lest there should be too much liquor to boil down at the last. For the same reason, I think it better not to pour water the third time upon the last parcel of dried roots, but rather use them immediately for food for cattle, as they will not pay well for boiling down.

Whenever there is a sufficient quantity of dried roots ready, the process of extracting the saccharine liquor should be continued day and night, as it is not proper to let the liquor remain longer than three, or at most four hours, before you boil it, lest a dissolution of the mucilaginous particles of the roots should take place.

If it is not convenient to boil down all the saccharine liquor at once to a state of crystallization, yet it should be daily boiled down to the consistence of a sirup, to prevent its fermentation.

In boiling the liquor, take off the scum which arises.

On the Boiling, Crystallization, *&c. of the* Beet Sugars.

FIRST boil the extracted saccharine liquors down to the consistence of sirup; then put it into a copper, of which one third at least is empty, and let it boil away, by a moderate fire, until a vial which holds one ounce of water will contain eleven drachms of the sirup, or until the sirup pours somewhat broad from the ladle.

As the froth or scum arises, it must be carefully taken off. When the sirup is arrived at the point above mentioned, by gentle boiling, the fire must be removed from underneath the copper, and the sirup gradually run through a clean woollen cloth placed over a wooden or stone vessel.

The sirup must not cool too much before thus filtered, otherwise it becomes ropy; when the filtered sirup is somewhat cool, it should be laded into shallow wooden or stone vessels, to crystallize:

shallow earthen vessels, such as are used to produce cream, are proper for the purpose. Vessels made of tin will answer.

These vessels, filled with sirup, must be placed in a room heated from fifteen to eighteen degrees of Reaumur's thermometer, or sixty-eight of Fahrenheit's; and care must be taken to keep them clear from flies and dust.

If the sirup has been of a proper consistence, crystals will soon begin to form at the bottom of the vessels: and in the space of eighteen or twenty-one days the crystallization will be completed. The mass must then be put into a strong linen sack, well secured, and placed under a press to squeeze out the liquid from the sugar which remains in the bag; the liquid matter may be set to crystallize a second or third time, and will yield sugar of a coarser quality. A cheese press or long lever will serve for the purpose of pressure.

The

The sugar first obtained may be rendered purer by well mixing therewith a small quantity of clear spring water, and placing it again under the press; the coloured sirup will then run out, and leave the sugar in the bag in a much purer state than before: by repeating the operation, it is so far improved, that, when dried and rubbed, it becomes a fine white powder sugar.

The separated sirups should be again carefully boiled, and more sugar will be obtained from them by crystallization.

If the sugar procured by the first pressure be dissolved in as much clear water as will form a sirup, and placed again in a warm room to crystallize, it will yield a much purer and harder sugar; the sirup may then be separated without pressure from the sugar, merely by inclining the vessel, and allowing the sirup to run off from the crystals.

All the sirups prepared as above directed, are fit for family use, and are much

much superior in taste to those prepared from the pressure of the raw or boiled roots.

The remaining thick sirups may be used as treacle or molasses, and will serve to distill for rum or spirits.

The process above mentioned is so simple and easy, as to be within the reach of every farmer to accomplish; on which account I have entered more minutely into a detail of it. I shall now annex some other observations, principally drawn from the experiments of Professor Lampadius, of Freyberg, near Dresden, by which it appears that Beet-roots contain water, fibrous matter, sugar, mucilage, glair, starch, colouring matter, scented matter, and a bitter substance. The water is in the proportion of from one half to two thirds of the weight of the roots; the fibrous matter of the roots differs, and is considerably more in poor than rich land; the saccharine particles vary from two to five

per

per cent.; the mucilage is from three to five per cent.; and the glair, or matter resembling white of egg, is about one per cent.; the starch is in very small quantity, being only about two or three ounces in a hundred weight: the colouring matter undergoes several changes by exposure to the air, as yellowish, brown, and red, and may be precipitated by acetite of lead: the scented matter is volatile; it rises in distillation of the root with water, combines closely with spirits of wine, and this matter occasions a peculiar contraction in the organs of taste. By boiling the Beet-roots the smell and taste are very much lessened. The bitter substance is soluble in water, and remains behind in the first sirup after the crystallization of the sugar.

The following are some experiments of Professor Lampadius.—One hundred and ten pounds of Beet-roots, the Beta cicla of Linnæus, or white English Beet, washed, peeled, cleaned, and then grated,

gave

gave a mass which weighed eighty-seven pounds; out of which were pressed forty-one pounds and a half of juice, which was boiled with twenty ounces and a half of charcoal powder: this, when filtered and evaporated down until crystallized, produced full five pounds of a brownish yellow-grained sugar, also five ounces of brown sirup.

The above brown sugar, after being dissolved in six pounds of lime water, mixed with one pound of blood, then boiled, filtered, and afterwards evaporated, yielded four pounds five ounces and a half of purified brown sugar, and six ounces and a half of sirup.

The four pounds five ounces and a half of sugar thus prepared, were again dissolved in six pounds of lime water, mixed with one pound of milk, then boiled for a quarter of an hour: during the boiling, a small quantity of white wine vinegar, and a little more milk, were added; the

the saccharine matter was filtered, and treated as before; the product was four pounds of well-grained white powder sugar.

The residuum after pressure, the brown sirups of the two first processes, and the remains of the filtrations, weighed, when collected, forty pounds: they were mixed with one quart of yeast and eighty quarts of water, heated to 40 degrees of Reaumur's thermometer, or 112 of Fahrenheit's, and, after fermenting forty-eight hours, were distilled. They furnished, at the first distillation, fifteen quarts of weak spirit, which, on a second distillation, gave eight quarts of a better; from which, when rectified, were produced three quarts and a half of spirits resembling rum.

From the result of this series of experiments it appeared, that after paying the farmer for the roots, and discharging all incidental expences whatever, a profit

fit was yielded of nearly cent. per cent. on valuing the four pounds of white powder sugar at one shilling per pound, and the three quarts and a half of rum at one shilling per quart.

It is not to be inferred from these experiments, that the profit from this process will always equal the above; for subsequent experiments have proved that the crops of Beet-roots cannot always be depended upon, nor do they always yield the same quantity of sugar; the produce of different years having varied, from two pounds of sugar per hundred weight of roots, to five pounds, according to circumstances which have intervened.

However, I hope you will find the culture of the Beet-plant an object of consequence, on considering that its leaves afford nourishment for men and cattle; that its roots may be used as food, or to furnish sugar, one of the greatest

greatest luxuries of life; that, after the sugar is extracted, the roots are even then serviceable for cattle; and that the refuse-sirups will produce a wholesome spirit. In dry summers its herbage will be of great service to cattle, and does not give a bad taste to the milk; and in hard winters the roots are wholesome food. The Beta cicla is the Mangel Wurzel, or Root of Scarcity, of Dr. Lettsom, who has said much upon its use as food. Its advantages are now called forth to notice in other points of view, and deserve attention. In particular circumstances it may become a very useful article; time will determine its real merits.

The remarks I have here given you are very short, in comparison with the observations I have collected, which extend through every department of the business. If you want any further information, I will furnish it; but the above

above accounts appear to me sufficient to engage your present attention.

I remain,

DEAR SIR,

Your affectionate Son,

JOHN TAYLOR.

Leipsig,
May 20, 1800.

To Mr. CHARLES TAYLOR.

The

Plan of Mr. Wakefield's Steam House.

Fig. 2.

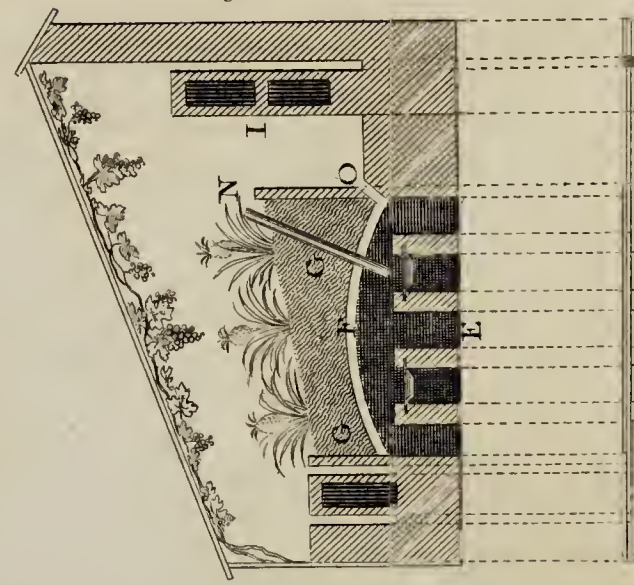


Fig. 1.

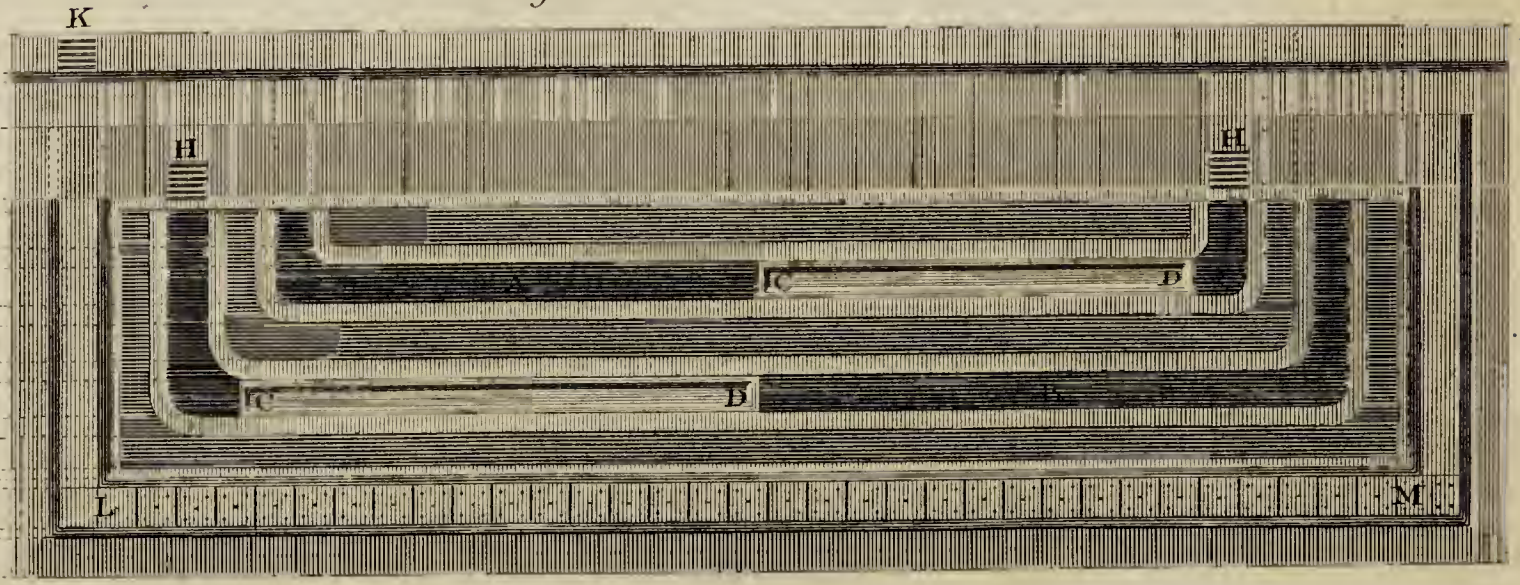


Fig. 4.

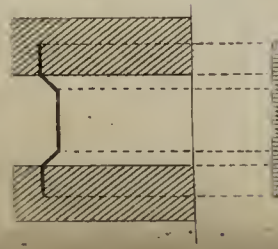


Fig. 3.

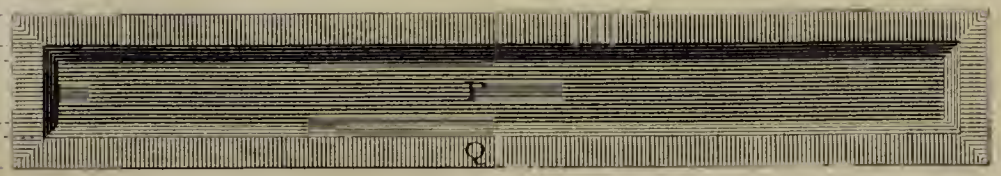
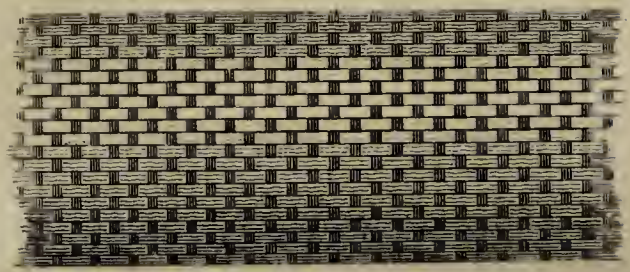


Fig. 5.



The following curious Account of the Method of FORWARDING VEGETATION BY MEANS OF STEAM, was communicated to the Secretary by his ingenious Friend THOMAS WAKEFIELD, Esq. of Northwich, and was presented to the Society by the Secretary.

The first Experiments were made in a Steam-house invented by Mr. Wakefield; the subsequent ones are copied from a Diary written by Mr. Butler, when Lord Derby's Gardener, and were made in a Steam-house built at Knowsley, by Lord Derby. All the Papers and the Drawings were received from Mr. Wakefield.

IN the year 1788, about the beginning of April, Mr. Wakefield being disappointed in several endeavours to procure Bark for a crop of melons in a Dutch

pit, twenty yards in length and three in breadth, thought he might contrive to heat it by Steam; and that, if he could succeed, he should ever after save the great trouble and expence of getting Bark in the neighbourhood of Liverpool. In a few hours, in the presence of two or three friends, he made a plan of the flues, arch, &c. according to the present method, and was then so confident of its succeeding, that he sent for workmen the next morning; and in a few days, under his direction, the pit was altered and fitted for the steam method.

From Mr. WAKEFIELD's DIARY.

EXPERIMENT I.

Commenced on the 25th of April, by putting some good melon-plants into three feet deep of strong melon soil. The plants grew very well, and were remarkably strong and luxuriant, but set no fruit till the 25th of July; they then produced

produced an abundant crop, excellent in flavour, thin-skinned, and thick-fleshed. It is now clearly proved, that their extreme luxuriance and backwardness in setting their fruit, was owing to the depth of the soil, as will be seen in the following year's experiments. It holds good in the fruiting of plants in general. Small pots will throw pines into fruit. Trees planted in deep soil, particularly pear-trees, are a long time before they fruit.

EXPERIMENT II.

1789.—Supposing that last year's soil was too rich, I planted this year in the same depth of a weaker soil, with a considerable addition of good clay marl, but less dung; thinking I should prevent, by this mean, the vigorous progress of the roots: but from the prodigious vegetating power attending this method, the plants grew equally luxuriant. Still they had no propensity to set their fruit until about the

same time of the year: the crop was again abundant and excellent. It was no uncommon thing for the fruit to grow in clusters of two and three, similar to walnuts; and universally each melon of the cluster ripened at the same time, and came to its full growth. Every thing is nearly the same as last year.

EXPERIMENT III.

1790.—As I now began to imagine that the depth of the soil occasioned the great luxuriance of the plants, I reduced it to two feet in depth. In consequence of this, the plants set sooner, but still late, and were too luxuriant. They produced, however, a most excellent crop, as well as in the former years.

EXPERIMENT IV.

1791.—Being now convinced of the necessity of not having the soil too deep, and wishing to ascertain the best depth, I filled the large pit with soil in such a manner

manner as to have a regular slope from end to end: the deepest part was two feet and a half, and the other one foot. The result was curious and interesting; for the fruit in the different lights set in regular succession, week after week, those plants fruiting first in the soil of one foot in depth. The crop was abundant; and on the deepest part of the soil, every thing was nearly as in the former years.

EXPERIMENT V.

1792.—This year the melon-plants were planted in fifteen inches of strong melon-soil, upon two feet of bark, that had been used two years before in the same pit, to prevent the steam from acting too powerfully on the soil, and to raise the plants near enough to the glass. All now succeeded well. The fruit set as well as on bark or dung, but was infinitely more luxuriant and productive.

During the last five years, the steam has been abundantly used in Mr. Wakefield's vine-house, with a success beyond his expectation. The first year the steam was used, the vines were much more luxuriant, and grew at least a month longer than formerly: to this circumstance the abundant crop of fruit the year following was in a great measure attributed, as it afforded time, after the fruit was gathered, for the embryo fruit to form in the buds for the ensuing year. Till now, it has been found difficult to furnish the plants with sufficient nutriment, both to ripen an abundant crop of fruit, and to swell the buds to that degree which is requisite to secure a good crop for the ensuing year. Through a want of this power, it frequently happens that vines, as well as other plants, seldom produce abundant crops for two successive years; but by the present method, Mr. Wakefield's vines have produced, for the last four years, fruit in the greatest abundance,

and

and of the best quality; the grape-berries being much larger than formerly, thinner skinned, and better flavoured. But a sufficient proof that the vine delights in this atmosphere is this, that if steam be sufficiently supplied during the whole of the summer, the leaves every morning will be pearled round the edges with drops of water exuded from the plant. This is frequently seen in every house during the spring, when the earth and the atmosphere are charged with moisture, for then vegetation is in the most luxuriant state. But this indication of vigour is never seen at any other season in the old method; and from the want of it, the red spiders too frequently make their ravages, though, when steam is given in sufficient quantity, that destructive insect is never seen.

From Mr. BUTLER's DIARY.

A periodical Account of Experiments made in forcing esculent Vegetables by means of STEAM, *with their success, as practised in a house erected for that purpose at Knowsley*, 1792.

Sept. 13.—Laid the foundation of a steam-house, forty-two feet in length, and twenty-two feet in width; the back of which is in height fourteen feet, the front five feet six inches, and the surface contains nine hundred and twenty-four feet.

I have generally found, that in well-constructed pine-houses (if not very much exposed) one fire is allowed for every four hundred square feet; as less than this, in very cold weather, would be insufficient to maintain a proper degree of heat, without making the flue too hot, and thereby generating a destructive atmosphere. If a greater number of fires were

were allowed, they would probably, in unskilful hands, or when left in the night, over-heat the stove. My reason for the extra one hundred and twenty-four feet to two fires (the number this house contains), was either to prove to a certainty that less fire is required by using the Steam than in the old method, or to be practically convinced that the contrary is true.

Jan. 1, 1793.—Sowed some cucumber seed of the Southgate long prickly kind in a one-light frame, placed on a dung bed, not only to raise plants for the steam-house, but also to ridge out on dung, to be treated according to the Southgate method, being the most approved and expeditious method hitherto known of raising cucumbers. The bed being in fine order, the seed quickly vegetated, and grew very fast. They were also fit to stop, having thrown out two rough leaves by the time the house above mentioned was finished, which was the 1st of February.

EX-

EXPERIMENT I.

Feb. 1.—This day ridged out six holes or lights on a dung-bed, it having been in preparation three weeks, and put twenty holes in boxes in the steam-house, placing them on the dry flue, in the back of the house. Also planted some French beans in pots, and placed some roses, pink carnations, and hyacinths, in pots, on the kirbs and pit.

Success of Experiment 1.

Cut a handsome fruit on the 28th of February, being eight weeks and three days from sowing the seed, and four weeks from the plants being first brought into the steam-house.

Feb. 3, 1793.—Found that the cucumber plants standing on the flue did not answer. Placed some of them on a shelf close to the back wall, being two feet from the glass, and also placed others on the surface of the pit.

The

The quantity of water evaporated the last night was twelve gallons. Found that this was rather too much, the plants being very wet, and dropping from the glasses very fast. The mercury in Fahrenheit's thermometer was, in the morning at seven o'clock, 64 degrees. A similar thermometer, plunged into the old bark, rose to 100 degrees. This is a very kindly heat for tan.

Feb. 6, 1793.—The plants of cucumbers look exceeding well; those on the shelf and those on the bark keeping pace with each other. The runners push on with a vigour and regularity I never before witnessed. The leaves are unusually dark; and on the shelf some fruit are showing.

The French beans are appearing very uniformly through the soil.

The roses vegetate in a manner truly astonishing. It is usual to see them, in the common method, break only from one eye, which is generally that at the extremity,

extremity, while the rest remain dormant; but here every bud seems to be eager for the lead, and, as in a kindly showery May, promise a profusion of flowers. The pinks are beginning to spindle; the carnations not much; but the progress of the hyacinth is wonderful. Quantity of water evaporated, ten gallons. Night thermometer, 66 and 101 degrees.

Feb. 8.—Cucumbers still grow rapidly. Those in the frames look as well as they generally do, but are by no means equal to those in the house. The progress is by no means equal; those in the house, with steam, growing as much in twenty-four hours as those in the frames in forty-eight hours.

EXPERIMENT II.

Brought in this day one cherry-tree, one peach, one apple, and a vine-bud. The cherry, peach, and apple, were maiden, or one-year old, from the bud or graft the last February, viz. 1792, being

being a May-duke cherry, a Royal George peach, and a Nonsuch apple, in pots. These were placed on the kirb of the stove. The vine had made about three feet of wood the preceding summer, and nearly the size of a quill: I put it into a pot filled with one half rotten turf from a loamy soil, one third rotten cow's dung, the remainder sand; the pot was eighteen inches over, and twelve inches deep. At the same time I headed the vine down to two eyes.—Brought in a pot of myrtle, geranium, and jessamin cuttings, and plunged them into the old bark.—The roses, &c. grow very strong and rapidly.

Quantity of water evaporated, sixteen gallons, or thereabouts. Thermometer suspended in the house, 68 degrees.

Feb. 14, 1793.—On the 12th sowed some cucumber-seed in a pan, and plunged it into the bark. Cucumbers still astonish me with the progress which they make—shew plenty of fruit.—Brought some potatoes into the steam-house—

roses

roses show a great many buds—hyacinths and pinks come forward very fast—peach, cherry, and apple do the same—some cherry bloom ready to burst out.—I found the plants rather too wet this morning, so only gave nine gallons, or thereabouts, to be evaporated this night.

Feb. 16.—Every thing going on well—first cucumbers came into bloom. Thermometer 67 degrees.

Feb. 17.—Peach, cherry, and apple, in full bloom—every thing else going on well—cucumbers sowed the 12th finely up—those first brought in, show plenty of fruit-bloom.

Feb. 23.—Cherry-tree blossom falling off, being evidently too hot—about a dozen set, but are evidently in too confined an atmosphere, wanting more air than the other things in the house.—French beans remarkably vigorous—potatoes coming up very fine: roses and other flowers look remarkably vigorous, as also cucumbers. The peach and apple bloom

bloom looks very fine. The cucumbers, in common frames, do very well, but are much behind.

Water evaporated about ten gallons each night. Thermometer, from 66 to 70 degrees.

Feb. 28.—Cut first cucumber in steam-house, being seven inches long, having been twelve days in bloom, twenty-eight in the house, and fifty-nine from sowing the seed. Cherries all turn yellow, and drop off—apple bloom does the same—too hot for them.

Peach does pretty well—every thing else still astonishes me with the rapidity of its growth—leaves of French beans and cucumbers highly beautiful—look as though they were in their true element—some of them are fourteen inches long, and as black as a hat.

March 1.—Every thing growing with a rapidity truly wonderful.

Water evaporated eighteen gallons each night. Thermometer, 68 to 73 degrees.

March

March 5.—Cut cucumbers, some of them eight inches and a half long: those in the common frame look very well—show fruit, and have two set.

The peach-tree has a great quantity of fruit set on it, which look remarkably well, and are free from insects.

EXPERIMENT III.

March 8.—Brought a great quantity of pine-suckers of last year—having disrooted and plunged them into old dust of bark, being the small bark riddled out of the old stoves.

Cut eight cucumbers, some of which were ten inches long—hyacinths, narcissuses, and jonquils, in fine bloom.

March 10.—Gathered first French beans, being remarkably fine. The quantity of cucumbers, in their different stages of growth now on the vines, is almost incredible: the plants are vigorous beyond description. Indeed this is the case with every thing in the house. No insect yet appears;

appears; the thrip is not even on the French bean over the entrance of the dry flue.

Water evaporated, eighteen gallons per day.—Thermometer, 68, 70, and 73, by night; but by day 80, 90, and 100—when plunged into the bark, 105 constantly.—A fine heat—give a little air every day about ten o'clock, if the wind is not high, and there is no rain.

March 15.—Every thing succeeds, and answers my most sanguine expectations. Turned out a pine plant; find it has got a fine root quite to the outside: the pot pines look remarkably well—suffered less from losing their roots than in the common mode of treatment. Cucumbers sown in this house as fine as those raised on dung.

Cut first-fruit in the common frames, being fifteen days behind the steam. The plants have received no check, and look very fine: six weeks and one day have

elapsed from ridging out, and ten weeks and four days from the sowing the seed.

Water usually evaporated is about twenty gallons, if a fine night and dry with wind; but if wet and close, ten or twelve will be found sufficient for a house of this size.

March 18.—Find the bark growing too hot for the pines—raised them half the depth of the pots out of the tan.

March 20.—Every article before enumerated doing well; obliged however to give over much steam, as the bark, although small and solid, is heated to a greater degree than I ever knew any such substance to be heated. The quantity of cucumbers now cut from this house is astonishing; some to the length of eighteen inches.

March 25, 1793.—Heat in the bark still continues very violent, although the steam has been discontinued since the 20th. The peaches swell very fast—

pinks

pinks in fine flower—a fresh quantity of moss and common Provence roses brought into this house—the first removed into the peach-house—vine-bud advances very rapidly, and is remarkably strong. Thermometer, in the night, 69 and 70 degrees; in the day, 80, 90, and 95.

March 30.—Heat begins to decrease—the disuse of the steam visible in the countenances of the vegetables: cucumbers are however very prolific. Begin to steam again this night, leaving open all the apertures. On one plant count ten cucumbers swelling off. Plants in the frames very healthy; but cannot find any plant with more on it than four or five.

April 6.—Heat in the bark again begins to increase—poured cold water on it, between the pots of pines, and find it has a very good effect.

Cut, since March 30th, one hundred cucumbers, most of them very fine ones—

the plants very healthy—leaves larger than common—French beans, peach, vine, and flowers, do equally well. The cuttings of jasmine, geraniums, &c. strike with wonderful facility.

April 10.—Nothing can exceed the fecundity of the cucumbers, the rapidity of the growth of the vine, and swelling of the peaches.—Their health and perfect cleanliness from insects are admired by every one—indeed they exceed my most sanguine expectations. Nothing fails but the addition of potatoes, as was before mentioned, for which the air requisite for the other things is not proper; for they are drawn up very weak. Notwithstanding, I have found some potatoes in each pot; but they are not in their degree of heat.

April 20.—I still find that the source of the steam being under the pit, is a great evil, as I am obliged to use it less copiously than most of the things which the house contains require. The pines being

being plunged into the bed when the body of the bark is sufficiently heated, I am obliged to do without steam, as I cannot procure it, without adding heat to the bark.

To prevent this inconvenience, see the remarks made by Mr. Wakefield, in his subsequent Letter, dated Oct. 6, 1800.

For want of steam, the aphis and thrips are making their appearance, neither of which, I firmly believe, would ever have been here had the steam been continued. However, as the pines are now the prime object, since cucumbers, French beans, &c. may be obtained by any mode of forcing, I attend solely to the quantity of steam the pine requires, or to what the bark requires to keep it in a proper degree of heat. Peaches swelled very fine, and are likely to be soon ripe.—Removed them into the peach-house.

May 15.—I find that steaming once in three or four days, having watch sticks

in the bark to ascertain the degree of heat by, is sufficient. I have about three feet of old bark on the perforated arch, which is as firm as treading and five months settling can render it. If it was quite cold, I think it would require two days to bring it to a growing heat. After that, it will, as before said, require the steam and dry flue once in three or four, or perhaps not more than once in six days, to be used.—The quantity to be ascertained by the degree of heat required.

June 1793.—Pines continue to do pretty well; but I think if they were by themselves, and there were no cucumbers, &c. in the house, they might be managed better.—As soon as the steam is disused, the thrips and aphis insects appear, but quickly disappear on applying it again.

July. — Pines still grow very fine—cucumbers do not so well, as I cannot steam, for fear of hurting the pines, except when I am in want of heat in the bark,

bark, which may at any time be obtained in sufficient quantity when the steam is used.

August.—Having determined to use the steam-house only for forcing cucumbers, French beans, melons, &c. and not pines, I removed the young plants into their fruiting pots, and placed them in common stoves.

Sept. 2.—Having removed the young pines, the steam is now constantly employed.—Brought some young cucumber plants from a dung bed, and transplanted them into boxes placed over the back of the pit within two feet of the glass; still preserving those on the shelf at the back, though apparently going off.

Sept. 8.—Brought forty pines in fruit, and plunged them half way to the rim in the old bark, these being the same as were placed in the house in February.—Found it growing very hot by constantly using the steam.—The old cucumbers, at the bark, begin to assume a new appear-

ance, and put forth fine runners. Took two of the boxes from the shelf, and placed them on the bark lengthways of the pit.

Sept. 10.—The young plants sown August 21, are astonishingly fine; the old ones set on the bark are likewise very fine: but those on the bark-shelf appear not so likely to produce a lasting crop as young ones. I removed them, and placed some young ones in their room.—Found much less steam required than in the spring; and that twelve gallons were sufficient for two, and, if moist or rainy weather, for three nights.

Sept. 15.—Cucumbers continue to grow very rapidly—pines swell very well—and this day brought in some French beans.

Sept. 20.—Cucumbers grew very rapidly, as also French beans—pines swell very well—potatoes were planted this day in boxes five inches deep, and two feet wide, having been previously sprit.

Sept.

Sept. 25.—Every appearance indicates a very successful experiment of winter-forcing. Cucumbers show abundance of fruit. French beans and pines look very well.

Oct. 1, 1793.—Cucumbers look very strong, and are showing abundance of fruit. The leaves are remarkably large, and of a very deep black colour.—Found I had committed an error in stopping the apertures between the laps of glass with putty, as the steam does not pass off sufficiently quick.

Oct. 4.—Several fine fruit shows on the cucumbers, which look remarkably fine. Pines swell very fast, there being an amazing heat in the bark. Water evaporated, only six gallons last night.—Thermometer, 67 at night, and 80 degrees in the day; when plunged in the bark, 105 degrees.

Oct. 10.—Cucumbers continue very fine, and as luxuriant as ever I saw them; but do not show so much fruit as in the spring—some few are swelling, and one

is in great forwardness. Pines swell their fruit very fast. French beans are finer than I ever saw at this season of the year.

Oct. 22.—Cut a fine cucumber this day, being seven weeks and three days from the time of sowing seed; a great number swelling off. Pines and French beans still do well. Water evaporated, from six to ten gallons per night, according to the weather.

Nov. 1.—Cut some fine fruit this day from the cucumbers, and some pines that have a very good appearance.

Took the vine out of the pot, and placed it in a pit that had no fire, to harden the wood, having made a shoot from a very small plant, as before mentioned, of forty-two feet in length, thirty of which is fine firm ripe wood, with very round prominent eyes—not the least appearance of a root coming through the holes of the pot.

Nov.

Nov. 10.—I was very much disappointed this morning in finding that the flue under the arch had burst, and that there had been much smoke and sulphur in the house all night. The destruction this had occasioned among the plants in the house was great. The French beans, and all the young fruit and tender branches of the plants, were totally destroyed. This misfortune happened through the negligence of a bricklayer in not cleansing the flues.

Nov. 20.—After the misfortune that happened on the 10th instant, I conceived that nothing more was to be expected from the cucumbers. I immediately had the flues cleaned; and having continued the steam ever since, I found that they were breaking out fresh and strong, and showing abundance of fruit. Had the plants received such a shock in a frame, I am certain that they could not have been so quickly brought about by any method, and I much doubt whether it would

would have been possible to effect it at all.

Nov. 25.—The cucumbers are doing well, beyond any conception I had formed, after experiencing the last misfortune. French beans are tolerably good; but I find that want of light is the only mischief which we have naturally to encounter.

Sowed some cucumber-seed in a pan, and placed it in the steam-house.

Dec. 1.—Cucumber plants sown the first are up, and look very well—the old ones show abundance of fruit, but do not swell them off freely.

At the time of erecting this house, I conceived that it was necessary to have it as air-tight as possible; and therefore I stopped every crevice, and laid putty between every square at the lap. I think it would have been better, had they been left open, and am now taking away the putty.

Dec.

Dec. 24.—Since the first instant I have experienced, that to stop the apertures between the squares with putty is an error; for, since I have removed it, the plants which before were always too wet, are now easily dried by using the dry flue, even in dark wet weather. The fruit on these plants swells more freely, and the young plants look very well.

Brought in this day some hyacinths, roses, carnation, pink, and syringa roots. The weather being dark, used but little water, ten gallons per evening being the mean quantity. If windy, more, if rainy, less is required. The plants should just be tipped on the edges in a morning, similar to the vegetables in a summer morning which has been preceded by a showery day. No certain rule can be laid down how a knowledge may be obtained of the quantity of water requisite to gain this desirable criterion of good management. An attentive observer will soon be able, by the appearance of the atmosphere,

to judge the quantity requisite, both of heat and moisture.—And here I would wish to give it as my opinion, that nature does not act by rules in rearing her tender saplings, but often changes her mode of treatment, from one extreme to another, in the space of twenty-four hours: I do not mean to say, that plants raised by art are as capable of sustaining such rude shocks as those left to nature; but this I believe, that more are killed by kindness than by bold management, both in the animal and vegetable world; from whence I infer, that a few degrees of difference in heat, or a few gallons of water, will not be productive of any bad consequence.

Nov. 29.—Stormy day—admitted a little air by propping up the bottom lights with a stone. The weather being windy, kept the holes open for the steam the greater part of the day. Cucumbers look very well—pines swell very fast. My foreman says that the Black Jamaica has

has swelled half a pound since it was first brought here.

Water used last night and to-day, ten gallons. Thermometer, 68 degrees at night—plunged into the bark, 101 degrees.

Dec. 6.—The season is at present as unfavourable for forcing as possible; and the steam has not been used so much as if the weather had been dry and windy. Every thing looks tolerably well, and some cucumbers swell as freely as any I ever saw. French beans grow better than I ever saw at this season; and a few pines swell very well. However, I have no doubt, if the weather was not quite so wet, and I could use the steam more copiously, but that I should be better satisfied.

1795. *Jan.* 6.—Cut this day, from the steam-house, seven as fine cucumbers as I ever saw in the month of May. The weather being frosty and clear, the steam is now used to great advantage.

tage. Fruit, that during the dark weather looked bright and well, but remained suspended as soon as the atmosphere became clear, and the sun burst forth, swelled away with a rapidity scarcely to be credited. The French beans are growing equally well. Pines swell very fast, and the cuttings of the Hydragonum Hortensium, and Rosea semper flora, strike with great facility.

Thermometer, suspended in the house, 68 degrees in the night—plunged into the bark, 100 degrees Nairne. In the open air, 26 degrees 6 minutes below freezing.

Jan. 13.—Cut nine fine cucumbers, and gathered a quantity of fine French beans. The weather still frosty, and consequently clear. Pines swell very fast. Thermometer, suspended in the house, 70 degrees, Fahrenheit's scale; 100, plunged into the old bark; 20 in the open air; and 12 below the freezing point.

Water

Water evaporated, about twenty gallons per night, much more being requisite in frosty than in mild weather. Quantity of coals burned, during the last twenty-four hours, three baskets, which are nearly equal to four bushels.

Jan. 20.—Cut this day thirteen cucumbers, and gathered a fine dish of French beans. Every thing is in as flourishing a condition as it is possible to conceive. Pines swell very fast. Thermometer remained, during the night, at 61 degrees. Sharp frost.—Thermometer, in the open air, 19 degrees 18 minutes, being 13 or 14 degrees below freezing.

Water evaporated, twenty gallons during the night, viz. from three o'clock P. M. until seven o'clock A. M.

Jan. 22.—Though the thermometer has been in the open air the last night, at 16 degrees, being 16 degrees below the freezing point, yet the plants in this house look as well as ever, the cucumbers having swelled their fruit as freely, or

more so, than when the thermometer stood at 36 or 40 degrees.

Jan. 24.—Though yesterday and this day have been cloudy, and attended with some snow, (the thermometer in the open air being at 25 degrees Fahrenheit) yet every thing flourishes admirably. The cucumbers are as fine as they can be conceived to be, growing very strait and rapidly. Three days since, I cut all that I could obtain; yet I measured one this day, and found it to be nine inches, which, on Tuesday the 20th instant, was only six inches in length. There is a beautiful bloom on it, and such as appears on those growing in dung in April, when the bed is in a fine growing state.

The young plants exceed those in the frames in the ratio of two to one. Some French beans planted in the common stove, at the same time as the plants were in this department, are not to be compared with them, as the plants are now in fruit, while the French beans, though

though they look very well, are not in bloom: the roses are blooming very finely.

Water evaporated last night, fourteen gallons. Thermometer, 70 degrees.

Jan. 26.—Cut this day seven brace of cucumbers, as fine as any I ever saw cut in April from dung-beds. I likewise cut some French beans. Pines swell very well; one that showed its fruit in 1794, and was then brought into this department, is now changing colour. The one that showed fruit in November, is swelling very fast. Thermometer, 70 degrees; in the open air, 44 degrees thawing.

Water used, twenty gallons in twenty-four hours.

Jan. 30.—The frost which is again set in, was last night remarkably severe; the thermometer being at $15\frac{1}{2}$ degrees. Yet nothing can exceed the beauty and healthful appearance of every thing in this house. It has been the opinion of some experienced in horticulture, that it would be impossible to do any good with

steam in very severe frosss ; but I always entertained a different opinion, and am highly gratified to find that I was not mistaken. It is now nearly two years since I first began to try experiments with steam ; and one circumstance only excepted, viz. the accident of the flue's bursting, in November, 1793, I have uniformly found every thing in this department always clean, healthy, and vigorous, beyond any instance I have ever witnessed ; and I have no doubt, should I live two years longer, of being still a witness of its wonderful efficacy in assisting vegetation, and of being enabled, during the spring and summer months, to bring every species of fruit to perfection, without the danger of being disappointed through insects, the natural consequence of a dry heat.

Feb. 3.—Laid a foot thick of rich soil on one half of the pit in this department, in order to turn some pine plants that are just showing their fruit into it, out of their pots.

Cut

Cut this day seven brace of very fine cucumbers, a quantity of fine French beans, and a very fine pine, which has never been in any place since it was in bloom but this house; and no bark has been brought in here since February, 1793.

Young cucumber-plants sown in December, 1794, are growing very fast, though the weather is very much against forcing. Last night there was a heavy fall of snow. Thermometer, in the open air, 24; in the steam-house, 70 degrees.

Feb. 9.—Cut this day thirteen cucumbers, and a great quantity of French beans from the steam-house; every thing being in a flourishing state. The earth that was brought into this department on the 3d instant, and laid on the bark, fourteen inches thick, and only half the breadth of the pit, is this day of a fine temperate warmth. Water evaporated, twenty-six gallons last night, being windy. Thermometer, in the open air, 38 degrees.

Feb. 10.—Turned sixty-six pine plants out of their pots, and planted them in the soil over the steam without any bark, the soil being of a fine temperate heat.

Feb. 16.—Cut this day five brace of cucumbers off the plants in this house.

Pines that were turned out of the pots look extremely well, as also does every thing in this house. Water used, twenty-four gallons during the night.

Feb. 23.—Cut this day six and a half brace of cucumbers, and a great quantity of French beans. Cucumbers are amazingly vigorous. Pine plants that were turned out of the pots look extremely well. Water as before.

March 2.—Notwithstanding the weather is very unfavourable to forcing, every thing looks well in this department. Cut this day six brace of cucumbers, and plenty of French beans. The pines look extremely well, and I have this day brought in the miraculous vine,

to

to see if it will effect any thing this season. Turned some plants of cucumbers out of small pots into tubs, there being one fruit on one of the pots. Water evaporated, twenty to twenty-four gallons. Thermometer, 73 in the night, and 80 degrees in the day; when suspended in the open air, 30 to 33 degrees.

March 9.—The weather is still as unfavourable as I ever knew it to be, so that it is with great difficulty that I can look into a frame; which makes a steam-house a very desirable thing, as, through this, necessary attendance may be paid to those vegetables that require it in any weather. Cucumbers are still fine. Cut this day the usual quantity. The pines growing without pots or bark look extremely well.

March 16, 1794.—I never remember such a season as this. So much snow, and so little sun, in March, are very uncommon. In some places the snow is two feet in thickness. I think I could

not have had a more unfavourable season for experiments. However the different kinds of plants in this house look very well. Cut this day thirteen cucumbers, and a great quantity of French beans. The pines have a good appearance, and the vine is breaking that bore the miraculous crop last year, and in the same pot, in a manner that is truly astonishing.

Water used, twenty gallons in the night. Thermometer 65 degrees in the night, and 70 degrees in the day; in the open air, 28 to 36 degrees.

Description *of the* Steam-House *invented by Mr.* Wakefield.

Fig. 1. THE ground-plan, showing the direction of the flues, upon two of which, A B, are placed flat copper pans, extending from C to D, three inches in depth, and made of thin rolled copper. These pans are fixed in the brick work, and supported by flat iron bars underneath; are inclosed in the steam vaults E, represented in the section of the house, *Fig.* 2; and steam is formed from water poured within them.

The roof of the vault F is a perforated brick arch. See *Fig.* 5, admitting the steam through the tan or soil G G, which is placed upon the arch, after it is covered with small slates or tiles, to prevent the tan or soil, in which the plants grow or are plunged, from trickling through the said arch.

The width of the soil-bed or pit is six feet; the depth of the steam-vault, E,

is

is four feet, from the bottom of the flue to the center of the arch; and the inside width of each of the flues A B, is fifteen inches. The height, from their bottom to the underside of the copper pans, is twenty inches. Each of these flues has a furnace H H, at the opposite ends of the house, and the smoke passes on through the back flues I.

There must be a separate furnace K, for the front flue L M, which flue is within the steam-house, and more elevated than the arch F. Upon this flue is placed a flat copper pan, similar to those already described; this pan extending from L to M, is used occasionally with or without water therein, as may be found suitable to the purposes explained in Mr. Wakefield's subsequent letter.

At N is a leaden-pipe to convey the water into the back pans below the arch: the other pans below are supplied in a similar manner. At O there are square holes, which must be left the whole

whole length of the building, to allow steam to mix plentifully with the atmosphere in the house.

Fig. 2. is a section of the steam-house: for references to the letters, see the accounts above.

Fig. 3. shows the form of one of the copper pans, upon a larger scale. P is the bottom of the pan; Q, the edges placed within the brick work.

Fig. 4. is a section of the pan and flue, to show the manner it is fixed in the brick-work, and the depth of the flue.

Fig. 5. is an upper view of the arch, to show the perforations therein previous to their being covered with tiles.

DEAR SIR,

IN answer to your enquiries I inform you, that it is better to have a long copper pan upon each flue, than several small ones. Mr. Butler's pan was made of iron; but copper pans are superior for the purpose.

The Duke of Bridgewater has lately built a steam-house on the present plan, which answers his expectations. I cannot say whether Lord Derby's steam-house is now used or not, as Mr. Butler has left Knowsley, and I have not been there since.

You will observe in Mr. Butler's experiments, that the bark was sometimes so heated by the steam below, as to render the continuance of it in that direction improper; therefore a copper steam-pan has since been placed over the front flue of the stove, and extending the whole length of the front, from

L to M, *Fig.* 1. This copper pan is covered with perforated tiles, similar to those used in drying malt, which afford the opportunity of pots of French beans being placed thereon. This situation is peculiarly favourable to these plants; and, at the same time, permits a sufficient quantity of steam for other plants in the house to ascend through the tiles, from the water heated in the copper pan beneath them.

Where there is no front flue in a vine-house, it will be found very serviceable to fix a flat iron boiler, at the back of the vine-house, in such a manner that the steam may pass from it by pipes through the wall from an arch or cover made over the boiler.

It is necessary, in the construction of all steam-houses, to be particularly careful that the flues for the smoke be sound and perfect, as nothing is more injurious to vegetation than smoke pervading the

the house from holes or fissures in the flues.

I remain,

DEAR SIR,

Yours sincerely,

THOMAS WAKEFIELD.

Northwich,
October 6, 1800.

To CHARLES TAYLOR, Esq.

REWARDS

REWARDS

BESTOWED BY THE

SOCIETY,

From October, 1799,

To June, 1800.

REWARDS

BESTOWED IN

AGRICULTURE.

Class 1. TO the Most Honourable the MARQUIS of TITCHFIELD, for having planted forty-nine and a half acres of land with Acorns, between October, 1798, and April, 1799, the GOLD MEDAL. See page 73.

Class 34. To THOMAS JOHNES, Esq. M. P. of Hafod, for having planted four hundred thousand Larch-trees, between the 24th of June, 1796, and the 24th of June, 1797, the GOLD MEDAL. See page 81.

Class 68. To the Reverend WILLIAM SMITH, M. A. of Craike, for having planted eleven and a half acres of land with Forest-trees, the GOLD MEDAL. See page 84.

Class 74. To JOHN LAKE, Esq. of Radfield, for planting six acres of land with Apple-trees, THIRTY GUINEAS. See page 96.

Class 88. To JOHN CARTWRIGHT, Esq. of Brothertoft Farm, for having planted sixty acres with Beans and Wheat, TWENTY GUINEAS. See page 180.

Class 97. To Mr. THOMAS JONES, of Fish-Street Hill, London, for cultivating four thousand and fifty-three plants of the true Rhubarb, THIRTY GUINEAS. See page 117.

Class 110. To JOHN MIREHOUSE, Esq. of Brownslade, for improving Waste Moors, the GOLD MEDAL. See page 134.

Class 122. To the Reverend HENRY BATE DUDLEY, of Bradwell Lodge, for having gained two hundred and six acres of Land from the Sea, the GOLD MEDAL. See page 150.

IN CHEMISTRY.

Class 175. To Mr. THOMAS JONES, of Fish-Street Hill, London, for having procured twenty-one pounds 7 ounces of Opium from Poppies, grown in Great Britain, FIFTY GUINEAS. See page 161.

IN POLITE ARTS.

Class 192. To Miss ELIZA BARRETT, of Stockwell, for a varnished Drawing of a Landscape, the GOLD MEDAL.

To Miss FRANCES TALBOT, of Wymondham, in Norfolk, for a Painting after Titian, the LARGER SILVER PALLET.

To Miss CHARLOTTE LLOYD, of Aston, near Oswestry, Shropshire, for a Drawing from a Bust of Euripides, the LESSER SILVER PALLET.

To Miss MARY SMIRKE, of Charlotte-Street, Fitzroy-Square, for a Drawing of the Entrance to the Monastery of St. Augustin, at Canterbury, the LARGER SILVER PALLET.

To Mr. JOHN COTMAN, of Gerrard-Street, for a Drawing

Drawing of a Mill at Dorking; the LARGER SILVER PALLET.

To Mr. WILLIAM WESTALL, of Upper Charlotte-Street, for a Landscape, being a View from the Terrace at Richmond, the LESSER SILVER PALLET.

To Mr. HENRY MOSES, of Constitution-Row, Gray's-Inn-Lane, for two Drawings of Shipping, the LESSER SILVER PALLET.

IN MECHANICKS.

Class 223. To the Widow and Children of the late Mr. RICHARD BOWES, of Conway, in North Wales, for Specimens of Mill-stones, and accounts of a Quarry thereof, near Conway, ONE HUN-

DRED POUNDS. See page 197.

Class 215. To Mr. THOMAS RUSTALL, of Purbrook-Heath, near Portsmouth, for a Parish or Family Mill, FORTY GUINEAS. See page 215.

Class 224. To Mr. S. HOLMES, of Castle-Court, Strand, for a cheap and useful Family Oven, FIFTEEN GUINEAS. See page 224.

To Mr. THOMAS ARKWRIGHT, of Chorley-Moor, in Lancashire, for a Chest-Lock, on a new construction, FIFTEEN GUINEAS. See page 239.

To Mr. WILLIAM BULLOCK, of Portland-Street, for a Lever Lock-Bolt, TEN GUINEAS. See page 245.

To Mr. GEORGE DAVIS, of Windsor, for a Method of

of preventing persons in carriages being injured when the horses have taken fright, THIRTY GUINEAS. See page 247.

IN MANUFACTURES.

To Mr. THOMAS CLULOW, of Cock-Lane, for inventing a Loom for weaving figured ribbands, FIFTEEN GUINEAS. See page 257.

IN NAVIGATION & COMMERCE.

To His Grace the DUKE BRIDGEWATER, for his great exertions in Inland Navigations, the GOLD MEDAL. See page 265.

IN COLONIES AND TRADE.

To ALEXANDER MACKENZIE, Esq. for the Dis-

covery of a Passage by Land, from Upper Canada to the South Sea, the GOLD MEDAL, agreeably to the Premium offered in 1792, Class 241. Vol. X. See page 289.

PRESENTS

PRESENTS

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SINCE THE PUBLICATION OF THE SEVENTEENTH VOLUME OF THESE TRANSACTIONS.

With the Names of the Donors.

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A Legacy of Five Hundred Pounds, bequeathed to the Society by the late Robert Nettleton, Esq. of Camberwell. For further Particulars of this Gentleman, see the Frontispiece and Preface to this Volume.

[*N. B.*

[*N. B.* In the Preface to the last Volume of the Transactions of the Society, it was stated that the Portrait of Dr. Peter Templeman had been presented to them by Richard Cosway, Esq. R. A. which was an error, it having been the gift of Caleb Whitefoord, Esq. one of the present Vice-Presidents].

MODELS

A CATALOGUE

OF THE

MODELS AND MACHINES

Received since the Publication of the Seventeenth Volume of the Society's Transactions, with the Numbers as they are arranged, in the Class to which they belong.

MANUFACTURES. CLASS III.

No. XXXIII. A NEW-Invented Loom for weaving Ribands, by Mr. Thomas Clulow, for which he received a Bounty of Fifteen Guineas. See Page 257.

MECHA-

MECHANICKS. CLASS IV.

CLXXIX. A Parish or Family-Mill, by Mr. Thomas Rustall, for which he received a Premium of Forty Guineas. See Page 215.

CLXXX. A new-invented cheap Family Oven, by Mr. Samuel Holmes, for which he received a Bounty of Fifteen Guineas. See Page 224.

CLXXXI. A Chest or Door Lock, on a new construction, by Mr. Thomas Arkwright, for which he received a Bounty of Fifteen Guineas. See Page 239.

CLXXXII. A Lever-Lock Bolt, for Folding Doors, by Mr. William Bullock, for which he received a Bounty of Ten Guineas. See Page 245.

CLXXXIII. An Apparatus for preventing Passengers in Carriages being injured when the Horses have taken fright, for which Mr. George Davis received a Bounty of Thirty Guineas. See Page 247.

A LIST

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AND

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OF THE SEVERAL

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A

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